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Finance and Economic Performance Across Countries

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FINANCE AND ECONOMIC PERFORMANCE ACROSS COUNTRIES

DISSERTATION

A dissertation submitted in partial
fulfillment of the requirements for the
degree of Doctor of Philosophy in the
Gatton College of Business and
Economics at the
University of Kentucky

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ABSTRACT OF DISSERTATION

FINANCE AND ECONOMIC PERFORMANCE ACROSS COUNTRIES

My dissertation consists of three papers on finance and economic performance across countries. The first paper applies the gravity model of international trade to quantify the impact of the banking sector and the stock market on bilateral trade patterns. Following the study of capital structure, I evaluate the mix of external financing sources used for real investment at the macroeconomic level by differentiating between the relative roles of the banking sector and stock market development in determining trade patterns. Using aggregate bilateral trade data for 87 countries over 1976-2012, I find that stock market development has a substantial impact on trade, distinct from the effect of the banking sector. There is ample evidence to suggest that there is a heterogeneous effect of banking at different levels of stock market development, indicating a substitutability between the banking sector and the stock market as sources of finance. This is true for both the poor and non-poor country samples. Moreover, I find some evidence indicating the importance of the importer's stock market development for bilateral trade after dividing my sample by income groups.

There is a consensus that financial development boosts economic performance. However, this literature relies on aggregate measures of financial development and rarely accounts for the distribution of access to finance across the population. How does financial inclusion, or the distribution of access to finance, affect growth? In my second paper, in order to capture the distribution of financial products, I include three financial inclusion variables. I explore the collective impact of the financial variables on three poverty measures. Controlling for time fixed effects and using an unbalanced panel dataset, I find that growth is less likely to increase in countries with already developed financial infrastructures. In the case of poverty as the dependent variable, the outcomes are not the same across all inclusion variables. Poverty is more likely to decrease in countries with fewer people having bank accounts and savings following an increase in financial development, but this effect does not occur when the measure of financial inclusion is borrowing. Borrowing only reduces poverty in countries that already have high access to financial products, but this is not true for developing countries that have lower access to basic financial services.

There is a large body of literature that provides evidence for the positive association between financial development and measures of international trade, however, the role of

financial development in affecting the extensive and intensive margins of trade has not been widely studied. My third paper seeks to investigate if increases in financial development increase trade diversification thus creating new trading relationships (extensive margin) and if it increases trade volumes for existing products thus maintaining existing trade relationships (intensive margins). Utilizing disaggregated product level data on exports, this paper finds that an increase in financial development increases the extensive margin. The analysis is also conducted for five different product categories. Evidence suggests that financial development increases total trade only for low-tech manufactured goods, while it increases the intensive margin for low-tech and high-tech manufactured goods only. This may have important implications for export-based policy making, especially in developing countries that aim to increase exports to increase long-term economic growth.

KEYWORDS: Financial Development and Inclusion; Stock Markets; Trade; Economic Growth; Poverty; Extensive and Intensive Margin

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Date: August 11, 2021

FINANCE AND ECONOMIC PERFORMANCE ACROSS COUNTRIES

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Date: August 11, 2021

To my parents, Shema and Swapan
and my brother, Samir

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Chapter 1 Introduction

Within the extensive economic growth, international trade, and poverty literature, numerous papers have evaluated the role of financial systems in shaping economic performance. In my dissertation, I examine the impact of different aspects of financial systems on macroeconomic and trade outcome variables. The primary outcome variables used to measure economic performance in this dissertation are: trade flows, the rate of economic growth, and the percentage of people in poverty.

The evolution of financial products and services and the availability of more data on financial systems have ushered into existence new relationships that must be studied to extract the impact of different aspects of financial systems on the aforementioned outcome variables. First, I acknowledge the different roles that banking systems and stock markets play in influencing bilateral trade values, therefore, making it imperative to examine the extent to which the two financial sectors impact international relative to each other. In general, for most countries, banking sectors tend to develop before stock markets do because formal banking had been the most basic form of financial service. In contrast, stock markets usually develop once there is a well established banking sector. Since the 1970s, international organizations like the World Bank have been encouraging developing countries to establish stock markets to spur economic performance, which has caused stock exchanges to open up in developing countries, especially in the African continent. Therefore, it is imperative to investigate how the effect of banking on trade has changed as stock markets have developed.

In recent years, another aspect of financial systems that has become an important point of discussion is the impact of financial inclusion on economic performance. Financial inclusion refers to the accessibility of financial services, often measured as the percentage of the population that have access to financial products under a formal financial system. While financial inclusion theoretically ranges from having a bank account to having access to more sophisticated financial instruments like insurance, most cross-country data simply measure the percentage of the population with access to a bank account, a savings account or a loan to operate or start a business or a farm. People in poor countries often face severe financial constraints, hampering economic activity and making it impossible for the underprivileged to escape the vicious cycle of poverty. The World Bank has made great accomplishments towards increasing financial inclusion in developing countries, thus changing the distribution of financial services within countries and affecting the impact of financial development on growth and poverty. A goal of this dissertation is

to evaluate the impact of financial inclusiveness on macroeconomic performance.

In my first paper, I examine the effects of banking sector and stock market development on bilateral trade flows using bank credit and market capitalization, utilizing panel data on aggregate bilateral trade flows. I argue that in order to identify the effect of financial systems on international trade, it is important to distinguish between banking sector development and stock market development because the two financial sectors are likely to affect trade differently. While the importance of the exporter's financial system for bilateral trade has been well studied, I also focus on the role of the importer's finance sectors in influencing bilateral trade. Additionally, I introduce an interaction between the banking sector and the stock market in influencing trade patterns. Furthermore, I analyze the extent to which these effects are driven by socioeconomic status of countries by dividing my full sample of countries into poor and non-poor countries.

In the second paper, utilizing country-level data, I seek to identify the impact of financial inclusion on economic growth and poverty, accounting for the level of financial development. I include three financial inclusion variables: the percentage of people with banks accounts, the percentage of people saving at a financial institution, and the percentage of people borrowing to start or operate a farm or a business. Together, these three financial inclusion variables capture the access to basic financial products in each country. Additionally, I examine how the effect of financial development on trade and poverty is different depending on the level of financial inclusion, and investigate how these estimation results are different for developing countries.

My third paper uses disaggregated product-level bilateral trade data to estimate the impact of overall financial development on total trade, the extensive and the intensive margins of trade. The extensive margin of trade measures trade diversification or the establishment of new trading relationships by measuring the number of products traded between countries. The intensive margin of trade measures the intensity of existing trade relationships by measuring the change in trade volume of existing products. The analysis has been conducted for a full sample of products and five different product categories, based on their skill and technology intensity. Additionally, this paper also studies if there is a heterogeneous effect of financial development on trade at different levels of financial development and economic development.

Overall, the estimation results from this dissertation have implications for financial policy across countries, particularly as it relates to international trade and development.

In what follows, Chapter 2 contains Paper 1, Chapter 3 contains Paper 2, and Chapter 4 contains Paper 3.

Chapter 2 Finance and Trade: The Role of Stock Markets and Importers

2.1 Introduction

What factors cause differences in international trade over time has been one of the most researched topics in international economics. Extensive research has shown that access to financial resources shapes the decisions exporters make, affecting international trade patterns. This paper contributes to that literature by evaluating how the banking sector and the stock market distinctly affect international trade patterns, the heterogeneous effect of banking at different development levels of the stock market, and the role of both exporters' and importers' financial systems in influencing trade.

Earlier theoretical research in international trade has focused on the role of cross-country differences in economies of scale, productivity, and factor endowments in predicting the gains from trade due to comparative advantage. Kletzer and Bardhan (1987) was one of the first papers to discuss that production costs may differ between countries when credit funding or trade finance is needed for real investments, even with identical technology and endowments. Much of the previous theoretical work had assumed perfect financial markets in which firms have access to as much financial capital as needed to take advantage of the most profitable business opportunities. In reality, however, this capital needs to be financed, either internally or externally. In the absence of adequate finance, trade is affected negatively. Financial constraints impede the activities of exporting firms, in particular. Chor and Manova (2012) explain that external finance[1] is important for exporting for various reasons including costs of financing working capital[2] due to time lags associated with shipment and payment, upfront costs associated with exporting abroad, and the costs of export market entrance and maintenance.

One of the earlier empirical papers by Beck (2002) explores the possible link between international trade and financial development to find evidence for the hypothesis proposed in Kletzer and Bardhan (1987). Beck's estimation results show support for their theoretical model: countries with well-developed financial sectors have higher shares of manufactured exports and trade balance in GDP and total merchandise exports. Subsequently Beck (2003) provides evidence that countries with greater reliance on external sources of finance have higher manufacturing trade shares and higher trade balances within indus-

[1] External financing describes funds that firms obtain from outside the firm, compared to internal financing which consists mainly of profits retained by the firm for investment.

[2] Working capital is calculated as current assets minus current liabilities. It is the capital of a business used to pay for its daily trading operations.

tries that use external finance more intensively. Wagner (2014) examines the direction of causality of this link between financial development and international trade and finds evidence that less financially-constrained firms self-select into exporting. Becker et al. (2012) predict that an increase in financial development increases trade (this is especially true when fixed costs are large) and that financial development increases the elasticity of exports with respect to the exchange rate. They measure financial development using private credit and accounting standards (an index of the quality and comprehensiveness of companies' balance sheets and income statements), and up-front costs using bilateral distance. Additionally, they find evidence that the allocation of exports across different importers is more responsive to exchange rates when financial development is higher. Huang and Temple (2005) find strong evidence that an increase in trade is followed by higher financial development in higher-income countries, but not in lower-income countries.

While the literature on the impact of financial development on international trade is extensive, there is a lack of research on the different sources of external finance that affect trade. Financial development measures the health of the "aggregate" financial system; however, this system itself comprises of distinct sectors like banking and stock markets i.e. different sources of external finance, which potentially have differential effects on bilateral trade patterns. While the trade literature focuses on the overall impact of the financial system on international trade, the corporate finance literature dwells more on the mix of sources of external finance influencing trade patterns. For example, when internal cash flow is not sufficient to fund capital expenditures, how does a firm decide to acquire external finance? The corporate finance literature identifies debt and equity as the two sources of external finance primarily utilized by firms when internal financing is not available. On a macroeconomic level, this is equivalent to a combination of the banking sector and the stock market as sources of finance available in a country.

Opening stock exchanges and equity market liberalizations promote efficient allocation of resources and firm level investment [Mitton (2006)], increase temporary growth at the very least [Minier (2009), Bekaert et al. (2005)], increase aggregate investment levels [Henry (2000)], and reduce the cost of capital [Martell and Stulz (2003), Bekaert and Harvey (2000)]. However, once opened and running, how does the development of these stock markets impact trade patterns? The empirical literature has found causal links between international trade patterns and financial development (mostly identified by measures of banking development), but the impact of stock market size on international trade relative to banking development has been somewhat neglected. An increase in exports is considered to be one of the channels through which growth rates increase. Better allocation

of resources, increases in firm-level and overall investment, and a reduction in the cost of capital are positively linked to trade patterns, especially the latter. This paper aims to investigate the relative importance of the banking sector and stock market development.

The international trade literature has considered the role of exporters' access to finance in determining exports, but has seldom evaluated the role of the importer or the destination country. Ma and Xie (2019) incorporated financial development conditions for both exporting and importing countries in country-pairs to investigate if banking credit of both partners affect the trade patterns between them. However, I evaluate the role of importers' banking development and stock market development, in addition to those of the exporters', in determining bilateral trade. In addition, I introduce interaction terms to find out if banking credit has a heterogeneous effect on trade as stock markets develop. Unlike Ma and Xie (2019), I do this for a full sample of countries and groups of poor and non-poor countries. Ma and Xie (2019) find that importers matter, too: the financial development of the importing or destination country increases the variety of goods being exported (extensive margin) and increases the volume of goods being exported (intensive margin). In addition, the financial development of the exporter and the importer act as substitutes in facilitating bilateral trade.

This paper is the first to consider the relative effects of the banking sector and the stock market using a gravity model and aggregate bilateral trade data. My dataset consists of 87 countries over 1976-2012 and the main findings can be summarized as follows. First, increases in both the exporter country's banking and stock market development are associated with increases in bilateral trade from the exporter to the importer. Additionally, there seems to be a heterogeneous effect of banking credit on trade for countries with less-developed stock markets, compared to well-developed ones, i.e. the positive effect of banking credit on bilateral trade keeps diminishing as stock markets develop and eventually becomes negative. Second, bilateral trade is increasing in banking sector and stock market development for the poor exporting countries sample as well, and the coefficient estimates are even larger in the case where poor countries are exporting to other poor countries. Third, there is some evidence indicating that the importers' financial systems matter for bilateral trade as well. The effect of a poor country's banking sector and its stock market on exports seem to be complementary to each other. Additionally, an increase in the stock market development of an importer increases trade, for poor and non-poor importers. Fourth, since the primary model utilizes remoteness indexes to account for multilateral resistances instead of the standard exporter-time fixed effects, I re-estimate the impact of the banking sector and the stock market using a method proposed in Heid et al. (2017a) as a robustness check. I find some supporting evidence suggesting that both

financial sector sectors are together important in determining bilateral trade.

The rest of the paper is as follows: Section 2 discusses the capital structure theory in relation to finance and international trade. Section 3 discusses the empirical specification and challenges associated with identification. Section 4 describes the data and Section 5 discusses the results. Section 6 looks at impact of the two financial sectors by income groups. Section 7 estimates the impact of these sectors using a different method using both international and intra-national trade flows.

2.2 Capital Structure Theory, Finance, and International Trade

One of the more disputed topics in the corporate finance literature is the capital structure question: What is the ideal combination of debt and equity that maximizes the interest of stakeholders in a firm? Modigliani and Miller (1958) had assumed that capital markets are perfect and frictionless, and disruptions to the equilibrium can be balanced out by financial innovation. However, capital markets are hardly perfect. When internal financing is not enough to fund business investments, firms naturally opt for external financing and their choice of finance has important implications for firm outcomes.

The corporate finance literature on capital structure focuses on how firms obtain funds to pursue profitable business projects when financial markets are imperfect. Beginning with Myers (1984) and Myers and Majluf (1984), several theories have been formulated and tested to explain the sources of external financing and mix of securities used by corporations. This strand of literature has substantial discussion on internal versus external financing. Foley and Manova (2015) discuss how firms operate in an environment of informational asymmetries and moral hazard. They further elaborate on the cross-country differences in availability of financial capital, how financial markets are not perfectly integrated across borders, and how this can be a source of financial distress. This ushered in speculation on the mix of sources of external financing that firms opt for when internal finance is insufficient. Myers (2001) discusses three major theories in detail: the pecking order theory, the tradeoff theory, and the free cash flow theory, but argues that there is no universal rule to predict financing choices. [3]

Despite the lack of consensus on the matter in corporate finance, at the macro level, financing choice could potentially elucidate the relationship between finance and international trade. However, the corporate finance literature usually only concentrates on firms and industries in a single country. The pecking order theory theorizes that when facing a

[3] Feidakis and Rovolis (2007) find evidence for a number of factors that determine firms' financing-choice behavior, namely firm size, industry, country, profitability, growth opportunities, liquidity, macroeconomic issues etc.

choice between internal and external financing, firms will always choose internal financing. However, if firms opt for external finance, they prefer debt instead of raising equity. Frank and Goyal (2003) explain this choice using a adverse selection comparison. Internal financing through retained earnings is associated with no adverse selection problem while debt is associated with minor adverse selection problem. On the other hand, to an investor, equity is the riskier asset and hence is associated with a considerably higher adverse selection problem. The tradeoff theory emphasizes the financial distress associated with high tax rates and justifies the prevalence of moderate debt ratios[4]. The free cash flow theory explains that, despite the associated financial distress, high debt levels increase value. To sum up, the pecking order theory emphasizes differences in information, the tradeoff theory focuses on taxes, and the free cash flow theory emphasizes agency costs.

Analogously, on a macro level, trade patterns are often reliant on the condition of acquiring adequate external financing as elaborated by trade papers like Chor and Manova (2012). Finding adequate financing is important for the decisions of exporting firms than non-exporting firms. Wagner (2014) adds that the direction of this link between financial development and international trade usually finds that less constrained firms self-select into exporting. Rajan and Zingales (2001) state that as the financial system develops and physical collateral becomes less important, industries can raise finance more easily. Hence, a natural question arises: are exports more responsive to some sources of finance more than others? Much of the corporate finance research on the theory of capital structure focuses on the debt-equity choice. Following the pecking order theory, this paper focuses on two primary sources of finance: debt and equity. At the macro level, this translates to the banking sectors and stock markets facilitating increases in trade value. The study of capital structure that introduces the idea of firm preference over financing choice also suggests that the banking sector and the stock market may affect trade flows differently. Most of the growth and trade literature uses domestic credit to the private sector[5] as a measure of financial development, excluding the stock market. I incorporate both private credit and stock market capitalization to allow for the distinct effects of these two components of financial development.

[4]Firms will borrow until the marginal benefit of tax shields on additional debt is offset by the increase financial distresses of bankruptcy or reorganization.

[5]This is more commonly known as private credit.

2.3 Data

The data for this paper include 87 countries spanning 1976-2012 and have been assembled from multiple sources. The bilateral trade data, export value in thousands of dollars, is from UN COMTRADE have been retrieved from the World Integrated Trade Solution (WITS). The finance variables, GDP, and population are from the World Development Indicators database of the World Bank. The two finance variables chosen for this paper, one for the banking sector and another to measure that impact of the stock market, have been selected following Levine and Zervos (1998). For banking development, I include the domestic credit to the private sector as a percentage of GDP, *Banking Credit*. It measures the value of loans made to the private sector by banks and other depository institutions. For stock market development, I include the market value of shares for listed domestic companies as a percentage of GDP, *Market Capitalization*. Capitalization measures the size of the stock market and has been used in the literature as a measure of stock market development. WTO membership status of each bilateral pair has been downloaded from the WTO website. $EIA_{i,j}$[6] is a multichotomous index (0-6) retrieved from the NSF-Kellogg Institute Data Base on Economic Integration Agreements. Data on average weighted distance, to calculate the remoteness indexes between countries has been downloaded from the CEPII database.

Table 1 depicts the summary statistics for selected variables (trade and financial) used in this paper and Table 2 shows the correlations between the financial variables and ln GDP of exporting and importing countries. All non-categorical variables are in natural logs. Over time, between 1976 and 2012, banking credit has increased by approximately 2 standard deviations of its mean, while market capitalization has increased by around 3 standard deviations of its mean value. This is due to many stock exchange openings since 1989. Minier (2009) finds 55 stock exchanges opened between 1976-1998. While banking credit and market capitalization are correlated positively, the correlation is about 0.60, suggesting that they may have distinct effects on trade volume.

2.4 Empirical Specification: The Gravity Model

The structural gravity model provides a framework for partial and general equilibrium analysis to identify factors that drive differences in bilateral trade. In the gravity model, the value of trade between any two countries is directly proportional to the size of the

[6]For $EIA_{i,j}$, 0 denotes no existing Economic Integration Agreement, 1 denotes a One-Way Preferential Trade Agreement, 2 denotes a Two-Way Preferential Trade Agreement, 3 denotes a Free Trade Agreement, 4 denotes a Customs Union, 5 denotes a Common Market, and 6 denotes an Economic Union.

trading partners' economies and inversely proportional to the total bilateral trade cost between each bilateral pair. After controlling for size, bilateral and multilateral trade barriers, and time and country-pair fixed effects, the panel gravity regression framework for 87 countries pooled over 1976-2012 can be represented as follows:

$$\begin{aligned}\ln export_{i,j,t} =& \beta_0 + \beta_1 \ln Bankcred_{i,t} + \beta_2 \ln Bankcred_{j,t} + \beta_3 \ln MCap_{i,t} + \beta_4 \ln MCap_{j,t} \\ &+ \beta_5(\ln Bankcred_{i,t} \times \ln MCap_{i,t}) + \beta_6(\ln Bankcred_{j,t} \times \ln MCap_{j,t}) \\ &+ \beta_x X_{i,t} + \beta_x X_{j,t} + \mu_{i,j} + \lambda_t + \epsilon_{i,j,t}\end{aligned} \tag{2.1}$$

where *i* denotes exporter, *j* denotes importer, and *t* denotes time in years. $\ln export_{i,j,t}$ is the natural log of the bilateral export value; $bankcred_{i,t}$ denotes the banking sector development of the exporter country and $bankcred_{j,t}$ denotes the banking sector development of the importer country. This variable is measured by the domestic credit to the private sector as a percentage of GDP and will be referred to as banking or bank credit for the rest of the paper. $MCap_{i,t}$ and $MCap_{j,t}$ denote the stock market development of the exporter and the importer country, referred to as market capitalization in the remainder of the paper. This is measured using the market value of shares for listed domestic companies as a percentage of GDP. $(\ln bankcred_{i,t} \times \ln MCap_{i,t})$ denotes an interaction term between banking credit and market capitalization of exporters which will help explain the effect of the exporter's banking sector on bilateral trade as the stock market develops, referred to as the exporter's interaction term in this paper, and likewise for the importer's interaction term.

$X_{i,t}$ and $X_{j,t}$ are vectors that contain exporter-, importer-, and bilateral pair-specific control variables like the natural log of Gross Domestic Product ($GDP_{i,t}$, $GDP_{j,t}$) and population ($Pop_{i,t}$, $Pop_{j,t}$) to control for country-level directional characteristics of exporters and importers that vary over time, regional trade agreements ($EIA_{ij,t}$), and WTO membership ($WTO_{ij,t}$) that control for bilateral pair characteristics that vary over time. EIA (Economic Integration Agreement) is an index variable that denotes the level of economic integration between each bilateral trading partner over time and WTO equals one if both trading partners are WTO members, zero otherwise. The two terms also include $ln\_REM\_EXP_{i,t}$ and $ln\_REM\_EXP_{j,t}$ that denote the natural log of remoteness indexes[7] constructed to capture the multilateral resistances faced by the exporters and importers over time.

[7] As demonstrated by Anderson and Van Wincoop (2003), in the absence of multilateral resistances terms in gravity regressions, variable estimations may lead to biases. Therefore, following Yotov et al. (2016a), the remoteness indexes are constructed as the logarithms of output- and expenditure-weighted averages

$\mu_{i,j}$ is the bilateral country-pair fixed effect term included to capture the time-invariant bilateral trade costs affecting trade like bilateral distance, common currency, common languages, and common religions between bilateral pairs. λ_t denotes the time-fixed effects term that captures and $\epsilon_{i,j,t}$ is the random error term.

A major challenge in estimating gravity models is determining the associated bilateral trade costs. The standard practice to account for these trade costs is to proxy for them using a list of observable variables: bilateral distance, dummy variables to capture common languages, common currency, common religions, regional trade agreements (RTAs), the presence of colonial ties, and an indicator variable for contiguous borders. However, including regional trade agreements raises the potential for endogeneity of trade policies within the gravity model, simply because these trade policies are likely to suffer from reverse causality i.e. negotiating an RTA might be influenced by the increasing trade between two trading partners. For example, profitable trade between two countries may cause them to self-select into more liberalized trade. Baier and Bergstrand (2007a) and later Agnosteva et al. (2014), Egger and Nigai (2015), and Yotov et al. (2016a) suggest including country-pair fixed effects in the regression equation to account for the correlation between the RTA variable and the error term. Including country-pair fixed effects absorbs the effect of all bilateral time-invariant variables like common languages, distance etc. and obviates the need to include them in the gravity equation.

Another challenge in estimating the gravity equation is accounting for the *multilateral resistances* facing each bilateral pair, as opposed to the bilateral trade resistances like distance that are being captured by including country-pair fixed effects. The idea of multilateral trade resistances is that trade between any two trading partners can not only be affected by the bilateral trade resistances between them, but also by the average trade resistances they face from the rest of the world i.e. two countries will trade more with each other the further they are from the rest of the world. For example, Australia and New Zealand trade in substantial quantities since they are physically close, and therefore experience low bilateral trade resistance. However, the trade between them is also affected by how remote they are from the rest of the world, creating high multilateral resistances. Hence, Australia trades more with New Zealand than it would if they were located in the

of distance between trading partners *i* and *j*:

$$\ln REM\_EXP_{i,t} = \ln \big(\sum_j DIST_{ij} / \frac{E_{j,t}}{Y_t} \big)$$

$$\ln REM\_EXP_{j,t} = \ln \big(\sum_i DIST_{ij} / \frac{E_{i,t}}{Y_t} \big)$$

middle of Europe. Gravity equations suffer from omitted variable bias if this resistance is not accounted for. This is why the literature suggests adding multilateral resistance terms to gravity model estimations. Anderson and Van Wincoop (2003) and Baldwin and Taglioni (2006) highlight the importance of including multilateral resistance terms. Multilateral resistance terms are theoretical constructs, therefore, measures for these terms are not directly observable. Yotov et al. (2016a) concludes that the best way to account for multilateral resistance is by including exporter-time and importer-time fixed effects in panel data. Anderson and Van Wincoop (2003) recommends not using remoteness indexes since these terms do not completely account for multilateral resistances leading to estimates suffering from upward bias. However, since the primary explanatory variables of interest (the financial variables) are country-time variables, exporter- and importer-time fixed effects cannot be included in the regression framework. Instead this paper aims to capture multilateral resistance by incorporating remoteness indexes for the exporter and the importer. This is a major limitation of this model, because in the absence of country-time fixed effects, the model is unable to absorb any other country-specific time-varying and unobservable characteristics of both the exporters and importers.

There are three aspects of the relationship between finance and trade that could be extracted from the above empirical specification. The first is the relative importance of the banking sector and the stock market for bilateral flows, represented by the coefficients on banking credit and market capitalization of the exporter country. The second item of interest is the role of the importer's banking credit and market capitalization in bilateral trade flows. Statistically significant and positive coefficients on the importer's banking credit and capitalization would indicate the importance of financially developed trading partners for the exporting country. The final component is the heterogeneous effect of banking credit at different levels of capitalization, which can be captured by the interaction term between the two finance variables. This aspect of the finance-trade relationship has not been studied in the previous literature but holds important implications for trading countries by providing more insight on the impact of diversified financial systems on trade flows.

2.4.1 Endogeneity of Financial Policy

Although the endogeneity of trade policy from including regional trade agreements has been addressed by including country-pair fixed effects, the possibility of endogeneity associated with financial variables is a concern. It is possible that countries aiming to increase export value self select into developing their respective financial systems, leading to issues of reverse causality. Some papers in the previous literature have looked into

causality running from exports to finance as well. Greenaway et al. (2007) finds that participating in export markets improves financial health of exporting firms. A good way to control for this reverse causality is by including exporter- and importer-time fixed effects. However, that is not a possibility since all finance variables are country-time. Therefore, to help eliminate endogeneity to a certain extent, I use lagged explanatory variables for regression equation (1). The contemporaneous export value may affect contemporaneous banking credit and capitalization, but is less likely to affect the previous period's banking credit and market capitalization.

2.4.2 Alternative Specifications

As robustness checks, I estimate my model using the following alternative specifications:

Heteroskedasticity of the Trade Data and Zero Trade Flows: Poisson Pseudo Maximum Likelihood Estimation. Recent developments in the empirical gravity literature have endorsed the various properties of Poisson Pseudo Maximum Likelihood (PPML) estimation, and it has become common in the trade literature to use PPML. Silva and Tenreyro (2006) pointed out that trade data is associated with heteroscedasticity, which causes estimates of trade costs and trade policy in gravity models to become biased and inconsistent when the gravity model is estimated in log-linear form using the OLS estimator. They also suggest that the PPML estimator is able to extract meaningful information associated with zero trade values which OLS would otherwise drop. Although the main specification in this paper is not estimated in a log-linear form and the number of zero trade flows is relatively very low, I estimate my specification using PPML estimation for comparison.

Gravity Estimation with Country Fixed Effects. As an alternative specification, I estimate my model using time-invariant exporter and importer fixed effects and gravity covariates (instead of country-pair fixed effects) for comparison. This approach has been used by Ma and Xie (2019) to look at the impact of overall financial development. However, first, the inclusion of time-invariant country fixed effects does not help in capturing the changes in the fixed effects over time. Second, gravity covariates are not completely able to soak up all the time-invariant country-pair characteristics, as with pair-fixed effects.

Two-stage Estimation of Gravity Equation. A group of papers in the literature have estimated the gravity equation using the two-stage estimation approach to estimate the impact of unilateral country- and time-specific policies on international trade using panel data. First, the gravity model is estimated using the country-time fixed effects without including the country-time specific variables of interest (my finance variables), and then second, the fixed values of the fixed effects from the first step are regressed on the variables of interest (which could not be included in the first step). The two-step approach has been

criticized because of a lack of research on its asymptotic properties [Heid et al. (2017a)]. Moreover, in the latter step, country-specific variables are perfectly collinear with the multilateral resistances, and therefore, the effects of any country-specific variables like income and multilateral resistances terms cannot be extracted from the unilateral policies in the two-step regression approach.

2.5 Empirical Results: The Impact of Finance on Trade

Table 3 presents the impact of banking sector development and stock market development on annual bilateral export value estimated using using OLS. All non-categorical variables are in natural logs to interpret the results as elasticities, and all regressions include time-fixed effects and country-pair fixed effects. All regressions include natural logs of GDP and population of both exporter and importer countries, WTO, EIA, and remoteness indexes as control variables. Column (1) depicts a typical regression often studied in the trade literature showing the impact of the exporter's banking credit on export value. This effect is positive but not statistically significant. Column (2) adds the second measure of finance, market capitalization, to the regression to capture the impact of the exporter's stock market on exports separately from the impact of the banking sector. *Ln market capitalization* is strongly positively correlated with export value and is statistically significant. However, there may be some interaction between the two measures of finance and, therefore, to capture the underlying relationship, Column (3) adds an interaction term between the exporters' banking credit and market capitalization. Adding an exporter's interaction term allows for the possibility of identifying substitutability between the two sources of external finance on a macroeconomic level. Studies that focus on the thresholds of banking development and equity markets have emphasized how banking development typically occurs before stock market development in the process of economic development. Boyd and Smith (1998) develop a theoretical model and explain that equity markets may develop in countries at later stages of economic development and eventually increase economic performance once a threshold level of economic and banking development has been achieved. The interaction terms help identify the role that the two finance sectors play in influencing exports as advancements in both sectors take place.

In this paper, I also examine the impact of the importer's banking sector and stock market development on trade value. The previous literature has primarily focused on the effects of exporter side banking development on trade. The regression in Column (4) represents the primary specification for this paper. Regressions (1)-(3) are restricted to

the sample in Regression (4) to allow for more direct comparisons.[8] Regression (4) adds the importer's financial variables to capture the importance of the destination country's financial system on trade value, and estimated coefficients for the exporters are almost identical to (3). The regression results show that the banking and stock market development of the exporter indeed matter for trade value. The PPML specification which has increasingly become popular in the empirical trade literature has been included in Regression (5) for comparison. The dependent variable of Poisson Pseudo-Maximum Likelihood (PPML) specification is the bilateral trade value (not logged) between the exporter and the importer, as required by the specification[9]. Regression (6) includes another alternative specification for comparison where traditional gravity variables like distance, dummy variables for contiguous borders, common language, common colony, and current colony have been included instead of pair-fixed effects, in addition to exporter-, importer-, and time-fixed effects. The middle panel of Table 3 shows the implied marginal effect of the exporters' banking credit at different percentiles of market capitalization.

The main results in Regression (4) of Table 3 support the hypothesis that countries with more developed banking sectors and stock markets export more. The coefficients on banking credit and market capitalization are both small but positive and statistically significant. Estimates of both the exporter side variables are positive and statistically significant in most specifications. Estimates from the PPML estimation in Regression (5) are lower than the main results in (4) which may be due to missing time-varying country fixed effects. The estimates in Regression (6) are higher than those in (4) possibly indicating that the traditional gravity variables were unable to absorb all time-invariant bilateral pair characteristics in the absence of pair-fixed effects.

Regression (4) of Table 3 also includes estimation results on the impact of importers' banking credit and market capitalization on bilateral export flows. The coefficients are positive across all specifications indicating the importance of the importers' financial system for trade, however, the coefficients are mostly statistically insignificant. Only in the case of the PPML estimation in (5) is there some evidence linking the importers' stock market and bilateral trade. Ma and Xie (2019) showed that better-developed financial systems of importers are associated with a higher volume and increased variety of exports. While their results may hold at the extensive and intensive margins, contrary to their find-

[8]Results are similar for Regressions (1)-(3) when no sample restrictions are imposed.

[9]The main objective of using the PPML method is that we do not have to take log of exports. Additionally, OLS estimation is unable to take into account the information within the zero trade values because they are simply dropped during the regression process. Logging of exports leads to biased and inconsistent estimates. Furthermore, trade data is known to suffer from heteroscedasticity, again leading to biased and inconsistent estimates. Silva and Tenreyro (2006) discuss that the PPML estimation is able to effectively take care of the heteroscedasticity and take into account the information within the zero trade values.

ings, this analysis shows that there is not enough evidence to conclude that the importer's banking and stock market development affect bilateral trade value overall.

The underlying relationship between an exporter's banking credit and market capitalization and how how these interact to influence bilateral trade introduces important narratives of heterogeneity into the finance-trade relationship. The coefficient of the interaction is negative and statistically significant in all specifications at least at the 95% level. This means that there is a possibility of substitutability between these two sectors as sources of external finance. The middle panel of Table 3 shows that at lower levels of market capitalization, the marginal effect of ln *bankcred* on ln *export* is positive. With higher market capitalization, the marginal effect of ln *bankcred* keeps decreasing and eventually becomes negative. This means that in countries with less developed stock markets, the banking sector plays an important role in increasing export value. However, the marginal impact of the banking sector on exports is eventually negative as stock market development increases. In Regression (3), the marginal effect of capitalization on exports is positive only for levels of capitalization below 31.1%, and approximately 45% of the sample has market capitalization below 31.1%.

This is consistent with Demirgüç-Kunt and Levine (1996) and Boyd and Smith (1998) who contend that countries at earlier stages of economic development depend more on the banking sector for increasing trade but further increases in economic performance beyond a certain threshold are associated with more sophisticated financial advances. This analysis finds further evidence that the two financial sectors can act as substitutes in affecting trade.

In other words, an increase in banking credit has a smaller effect on trade value in countries with highly developed stock markets than in countries with less-developed stock markets. This aspect has not been studied in previous literature and sheds new light on the finance-trade relationship. The interaction term appears less significant for importers.

There are three main conclusions we can draw from Table 3. First, market capitalization has a significant impact on export value, in addition to banking credit. This emphasizes the importance of stock market development which appears to be at least as important as banking sector development. Second, there is an interaction between the exporter's banking credit and market capitalization indicating the decreasing importance of the banking sector in increasing bilateral trade and a possibility of substitutability of these two sources of finance. Third, there is no evidence to suggest that banking credit of the importer matters for trade but there is some evidence that market capitalization of the importing country matters, although the effect is not as strong as that of the exporting

country.

While the results in Table 3 suggest that the relationship between banking credit and exports may depend on the level of stock market development, the analysis includes countries at all income levels. Previous work has shown that many economic relationships vary by overall development level, so in the next section, I consider poor and non-poor exporters.

2.6 Impact of Finance on Bilateral Trading Partners: By Income Groups

In this section, I address the implications of increased banking and stock market development for different income groups. Poor and rich countries are at different stages of economic development, meaning that overall economic and financial structures in these countries are different (Demirgüç-Kunt and Levine (1996), Boyd and Smith (1998)). While poor countries are more likely to be reliant on the banking sector, richer countries have additional financial resources stemming from more developed stock markets. This is evident when comparing summary statistics between income groups. Comparing average levels of banking credit and market capitalization between poor and non-poor countries, on average, non-poor countries have levels of market capitalization 32% higher, and banking credit 18% higher than that of poor countries.

Demirgüç-Kunt and Levine (1996) provide evidence that equity markets tend to grow in countries at advanced stages of economic development and may be unnecessary for less developed countries, both in terms of financial and economic standing. Greenwood and Smith (1997) explain that developing stock markets are associated with additional costs that are feasible for richer or more developed countries. Boyd and Smith (1998) develop a theoretical model and describe that equity markets may be superfluous for countries at earlier stages of economic development but eventually increase economic performance once a threshold level of economic and financial development has been achieved. Minier (2003) finds a positive correlation between economic growth and market capitalization for high-income countries, but not for low-income countries. Therefore, the impact of financial systems on international trade between an exporting and an importing country may depend on the income levels and financial structure of both countries. The World Bank classifies countries by income[10] into four primary groupings: low, lower-middle, upper-middle, and high. The World Bank provides annual income thresholds for all these groups. I use the World Bank income classifications to divide countries into

[10]Income is measured using gross national income (GNI) per capita, in U.S. dollars, converted from local currency using the World Bank Atlas method.

non-poor (high-income and upper-middle-income) and poor (lower-middle-income and low-income) countries.

2.6.1 The Case of Poor Exporters vs Non-Poor Exporters

Table 4 presents results for poor and non-poor exporters. Regression (1) presents results for poor exporters and Regression (2) presents results for non-poor exporters. Estimates from Regression (1) reemphasize the importance of banking and the stock market for poor exporting countries as sources of external finance. The coefficient of the exporter's interaction term is negative and statistically significant at the 99% level, indicating that the influence of banking development on trade is lower for countries with bigger stock markets.

While poor exporters have been more thoroughly examined by the literature, the comparison between poor and non-poor exporters may provide additional insights. In both Regressions (1)and (2), the coefficients of both banking credit and market capitalization are positive and statistically significant at least at the 95% level. The exporter's interaction term of both regressions is negative and statistically significant at the 99% level indicating that there might be some degree of substitutability between banking and stock markets. For further insight, I look at the marginal effect of banking credit at different levels of market capitalization i.e. how does the effect of banking on exports change as stock markets develop? For poor exporters, the marginal effect of banking credit is positive and statistically only at the 10th percentile of capitalization. This reaffirms the importance of banking in increasing trade of a poor country that is at early stages of economic development. For non-poor exporters, the marginal effect of banking credit is positive at the 10th percentile of capitalization but are negative at the median and the 90th percentile at the 99% level of statistical significance. This suggests that, in non-poor countries, banking sectors increase exports up to certain threshold of capitalization, but as stock markets develop further, banking sectors become less important for increasing exports.

A comparison of marginal effects of banking credit at different percentiles of capitalization between poor and non-poor exporters shows that there is evidence of a heterogeneous impact of banking credit for non-poor exporters but not for poor exporters. This could have important implications for financial reform policies devised by international organizations that have maintained that improving financial systems in poor countries may help achieve growth and trade targets faster. There has been a surge in the stock exchange openings in developing countries since the 1970s. Results from this table indicate perhaps increasing economic performance in poor countries might be more difficult than opening up stock exchanges and that the banking sector still remains an important

determinant for increasing trade in poor countries, while it becomes less important for increasing trade in non-poor countries as stock markets develop.

2.6.2 The Case of Poor Exporters

Table 5 presents results for only poor exporting countries. Regression (1) presents results for the situation when a poor country exports to all importing countries, the same as Regression (1) of Table 4. Regression (2) of Table 5 presents coefficients for the situation when a poor country exports to another poor country, and the estimates are larger than that of the all importers sample. The difference in the magnitudes between banking credit and market capitalization is small, however, the more interesting thing is that these estimates are much larger than the corresponding estimates in Table 3. The exporter-interaction term between a poor exporter's banking credit and market capitalization is negative and statistically significant indicating that there could be a heterogeneous effect of banking credit. However, the marginal effects of banking credit are statistically insignificant at all three levels of capitalization. There is no evidence to suggest that the export value of a poor exporter is affected by the banking of a poor importing country.

Regression (3) presents estimates for when poor countries are exporting to non-poor countries. The coefficient on the importer's capitalization is positive and statistically significant at the 90% level, indicating that bilateral trade increases as the poor-exporting countries trade with non-poor countries with more developed stock markets. This is intuitive because non-poor countries with better developed financial systems are likely to import more. Results from this column suggest that a poor country's export value to a non-poor country depends on the former's banking development. This provides further support for the importance of the banking sector for poor countries, as in Regression (2). Furthermore, there is no evidence indicating the importance of the non-poor country's banking and stock market development for a poor country's exports. Lastly, statistical insignificance of the interaction terms provide no proof to suggest that either the poor exporter or the non-poor importer's banking sector and stock market work as substitutes to influence trade.

The lower panel of Table 5 notes the implied marginal effect of bilateral exports with respect to the banking credit of the exporter at the median level of market capitalization. For the case when poor countries are exporting to all countries, the marginal effect of banking credit at the median level of capitalization is 0.141 indicating that further increases in banking credit increase trade value. The lower panel of Regression (3) shows that the implied marginal effect for the poor exporter-non-poor importer case is 0.275 implying

that when the same poor exporters are trading with non-poor countries, banking sector development still plays a big role in influencing trade between them.

2.6.2.1 The Marginal effect of Banking Credit at the 10th and 90th Percentiles for Poor Exporters: By Income Groups

Calculating the marginal effect of banking credit for the 10th and 90th percentiles of market capitalization for different income groups yields different results compared to that for the full sample. All results are calculated for 2012. Table 6 shows the marginal effects.

Among poor exporters, an example of a low-capitalization country (at the 10th percentile of market capitalization) is Nigeria, and a high-capitalization country (at the 90th percentile) is the Philippines. In the case of a poor exporter and a poor importer, the marginal effect of banking credit for Nigeria is positive while that for the Philippines is negative, although neither is statistically significant. The marginal effect becomes zero and subsequently negative when ln of market capitalization is 4.106, which translates to a market value of shares for listed domestic companies as a percentage of GDP of 60.73%. Roughly 54% of the exporters in the regression sample fall below this level of capitalization. In the case of a poor exporter and a non-poor importer, the marginal effects of banking credit for Nigeria and for the Philippines are both positive and nearly identical in magnitude. This implies that when a poor country is exporting to a non-poor country, banking development is positively correlated with exports irrespective of the level of capitalization of the poor exporting country.

2.6.3 The Case of Non-Poor Exporters

Table 7 shows results for non-poor exporters only. Regression (1) repeats results for the situation when a non-poor country exports to all importing countries for comparison, the same as Regression (2) of Table 4. Regression (2) of Table 7 shows the case a non-poor country exports to a poor country. It again shows the importance of the banking sector and stock market for non-poor countries that export to non-poor countries. Moreover, there is evidence to indicate that the banking sector and stock market of a non-poor exporter act as substitutes for sources of finance when exporting to a poor country. The surprising result is the negative and statistically significant (at the 95 % level) coefficient on the poor importers' capitalization suggesting that having more developed stock markets is correlated with lower imports. Lastly, the interaction term between a poor importer's banking credit and capitalization becomes positive and statistically significant in this regression suggesting that the two sectors complement each other as sources of finance for

a poor country as an importer. This is in contrast to the previous results that found no evidence to suggest that the importer's finance choices were either substitutes or complements in influencing exports. Therefore, increases in stock market development in a poor country actually accentuate the increasing impact of the banking sector on its imports. This is an interesting finding because finance sectors of the exporter have been found to be substitutes in influencing trade in both the finance and trade literatures but in the case of non-poor exports to poor importers, the importer's financing sectors complement each other.

Regression (3) presents the case when a non-poor country exports to another non-poor country. The exporter-side regression results are consistent with the all-country sample: the impact of developments in the exporter's stock market tend to increase trade value, in addition to the banking sector. The exporter's interaction term indicates that banking and stock markets are substitutes in influencing export value. This regression reaffirms the importance of the stock market in non-poor countries and how the impact of the banking sector on exports lessens as the stock market develops further. Lastly, there is no evidence to suggest that the importer's finance sectors act as substitutes in affecting export trade value.

The lower panel of Table 7 notes the implied marginal effect of bilateral trade with respect to the banking credit of the exporter for non-poor countries at median level of market capitalization. For the case when non-poor countries are exporting to all countries, the marginal effect of banking credit at the median level of capitalization is -0.072 indicating that further increases in banking credit become less important in influencing export value. Estimates show that beyond a threshold level of of 30.6% of GDP, market capitalization matters more for increasing exports for the non-poor exporters[11].

The difference in the marginal effects reflects how sources of external financing could affect exports differently depending on the income levels of the importing country. Although income levels are positively correlated with all sources of external finance, they are not perfectly correlated, and the marginal effects vary between regressions owing to the variation in financial development within the group of non-poor exporting countries. Some countries in the non-poor income group have financial systems that are comparable to those of some poor countries. For example, Argentina classified as a non-poor country

[11]Regression (2) shows that the implied marginal effect for the non-poor exporter-poor importer case is positive and statistically insignificant at 0.013. For the non-poor exporter-non-poor importer case in Regression (3), the marginal effect at the median of capitalization is negative and statistically significant at -0.099 meaning that for non-poor exporting countries with median level of stock market development, further improvements in the banking sector become less important for increasing export value when exporting to other non-poor countries as the stock market becomes more indispensable for increasing trade value.

has banking credit and market capitalization of 2.64 (14% of GDP) and 2.11 (8% of GDP) which are similar to that of Ghana, classified as a poor country.

2.6.3.1 The Marginal effect of Banking Credit at the 10th and 90th Percentiles Non-Poor Exporters: By Income Groups

Calculating the marginal effect of banking credit for the 10th and 90th percentiles of market capitalization for different income groups yields similar results as that for the full sample. Table 8 shows the marginal effects.

A non-poor exporter exports either to a poor importer or to a non-poor importer; for both cases the low-capitalization country at the 10th percentile of market capitalization is Cyprus while the high-capitalization country at the 90th percentile is the Luxembourg. In the case of a non-poor exporter and a poor importer, the marginal effect of banking credit for Cyprus is positive and the that for Luxembourg is negative. This means that a non-poor exporter with low capitalization relies more on banking development to increase exports compared to a non-poor exporter with high capitalization. The marginal effect is zero when ln of market capitalization is 4.259 which translates to a market value of shares for listed domestic companies as a percentage of GDP of 70.73%. Roughly 85% of the regression sample falls below this level of capitalization. In the case of a non-poor exporter and a non-poor importer, the marginal effect of banking credit for Cyprus is positive but close to zero and that for Luxembourg is negative. A marginal effect of close to zero makes sense because Cyprus is already at advanced stages of economic and banking development, in addition to a growing stock market. In case of exporting to a non-poor importer, the marginal effect becomes zero and subsequently negative when ln of market capitalization is 2.807 which translates to a market capitalization of 16.56%. Roughly 22% of the exporters in the regression sample fall below this level of capitalization, meaning that most of the exporters have high stock market development. This suggests that exports of non-poor countries that export to poor countries tend to be influenced by banking development even at high levels market capitalization while diminishing returns to banking development sets in at lower levels of market capitalization for those that export to other non-poor countries. This indicates that non-poor countries that rely more on stock markets for finance tend to export to other non-poor countries while those that rely more on the banking sector tend to export to poorer countries.

Dividing the sample by income groups into poor and non-poor categories further explained the relationship between finance and trade. Consistent with the all-country sample results from Table 3, exports from non-poor countries is reliant on both banking and stock market development. On the contrary, exports from poor countries mostly depends

more on banking. This is also consistent with the analogy that countries at different stages of economic development depend on different aspects of the overall financial sector. A poor exporter's stock market development matters when it is trading with another poor importer but not when it is trading with a non-poor importer. Exports from a non-poor country to a poor country depend on how developed the importer's banking sector is. Interestingly, increases in stock market development in a poor country increase the impact of the banking sector on its imports as they act like complements in increasing export value of the non-poor country.

2.7 Aggregate Manufacturing Sector Data: International and Intra-national Trade Flows

The structural gravity model has become prevalent and popular in the empirical trade literature to study the effects of various policies on trade flows owing to its successful identification of such trade policies. However, despite its increasing success, the gravity equation cannot be used to extract the effect of any unilateral or non-discriminatory trade policies or any other non-trade policies at the country level. As Head and Mayer (2014a) noted, that effect of these policies cannot be estimated using the structural gravity equation because the exporter- and importer-time fixed effects would completely absorb them due to perfect collinearity, but need to be included to account for multilateral resistances as per Anderson and Van Wincoop (2003).

This aspect of the gravity model constitutes a challenge in the quantification of the impact of unilateral non-trade policies and financial variables like banking credit and market capitalization as well. In fact, a good number of variables are associated with unilateral measures which could uncover some important trade relationships. As is true for this analysis, the estimates and corresponding interpretations of the previous tables may need to be interpreted with caution because of missing directional time-varying fixed effects.

2.7.1 Data and Identification Strategy

As a solution to these challenges, Heid et al. (2017a) designed a simple and theoretically consistent method to extract the effects of unilateral or non-discriminatory trade policies on international trade, even in the presence of exporter-time and importer-time fixed effects. This method can be applied to non-trade policies and variables like banking credit and capitalization as well. To begin, their solution incorporates the usage of *intra-national* in addition to international trade flows. This means that the financial variables can be identified even in the presence of country-time fixed effects because the intra-national

observations provide the variation required for identification since the financial variables will only apply to international trade and not domestic trade.
Following Heid et al. (2017a), the specification for this section is as follows:

$$\ln export_{ijt} = \beta_1 \ln BankCred_{it} \times I_{ij} + \beta_2 \ln MCap_{it} \times I_{ij} + \gamma GRAV_{ijt} + \eta_{it} + \mu_{jt} + \epsilon_{ijt}, \forall i, j \tag{2.2}$$

where $\ln export_{ijt}$ denotes the nominal trade flows from exporter *i* to importer *j* at time *t*. The difference between this dataset and the one used earlier in this paper is that this also includes internal trade data (X_{iit}). I_{ij} is an International dummy equal to 1 for international trade and equal to 0 for intra-national trade. The variables of interest are the financial variables interacted with the International dummy: $BankCred_{it} \times I_{ij}$ and $MCap_{it} \times I_{ij}$. $GRAV\_ijt$ is a vector including all standard time-varying trade determinants[12] and time-invariant gravity covariates[13] Following Heid et al. (2017a), I will replace $GRAV_{ijt}$ with pair fixed effects in some regressions for experimentation. η_{it} and μ_{jt} denote the sets of exporter- and importer-time fixed effects to capture any time-varying country-specific determinants of trade and multilateral resistances. ϵ_{ijt} is the error term. Errors are clustered at the exporter and importer level.

The trade data for this section is from the Yotov et al. (2016a) book constructed to include both international and intra-national trade flows assembled by Thomas Zylkin. The original sources of this dataset are the UN COMTRADE database and CEPII TradeProd database The final balanced panel dataset covers the aggregate manufacturing sector of 69 exporters and importers over the period 1986-2006.

2.7.2 Empirical Results

Table 9 presents results for the main specification (from Equation 1) in Regression (1). Regressions (2)-(5) of Table 9 presents the results for the proposed method to identify estimates of the impact of unilateral variables banking credit and market capitalization, even in the presence of exporter- and importer-time fixed effects. Following Heid et al. (2017a), I estimate this specification using both OLS and PPML techniques. Using traditional gravity variables in regressions (2) and (3), I obtain positive and statistically significant estimates for both financial variables which suggests that both bank credit and market capitalization are jointly important for influencing international trade. In terms of economic magnitude, estimates from (2) indicates that a 10% increase in bank credit increases trade by 11.7% while the same increase in capitalization increases trade by 0.65%.

[12] regional trade agreements

[13] international border dummies to capture globalization effects, common currency, common colony, common language, current colony, log of bilateral distance etc.

Estimates from OLS estimations in (2) and (4) are, in general, larger than those from PPML estimations in (3) and (5). The estimates for bank credit are no longer statistically significant when controlling for bilateral pair fixed effects in regressions (4) and (5).

2.8 Robustness Checks

2.8.1 Estimation of Panel Data with Intervals

The adjustment of trade flows in response to advancement in the financial system is unlikely to be instantaneous. In addition, the financial variables do not vary substantially from year to year. Yotov et al. (2016a) points out that the adjustment of trade flows is likely to be more challenging in specifications using fixed effects. Trefler (2004) suggests against estimating trade equations pooled over consecutive years. Cheng and Wall (2005) explained that fixed-effects estimations using panel data pooled over years is criticized because dependent and independent variables cannot fully adjust in a year's time. Overall, the trade literature recommends experimenting with alternative intervals in order for allow for bilateral trade flows to adjust over time in response to changes in trade costs. Trefler (2004), Baier and Bergstrand (2007a), and Anderson and Yotov (2016) use intervals to estimate trade equations. Olivero and Yotov (2012) find evidence that estimations using intervals provide consistent estimated across different intervals compared to panel data pooled over consecutive years. Therefore, this section estimates the gravity equation using different intervals.

Table A.9 in the appendix presents results for gravity estimation using 3-year, 4-year, and 5-year intervals, comparing it to the main results from the pooled dataset in Column (1). The estimates using intervals are larger compared to the the main results.

2.9 Conclusion

The effects of banking sector and stock market development on bilateral trade flows using bank credit and market capitalization have been examined in this paper, utilizing aggregate bilateral trade flows and a panel data approach for 87 countries over 1976-2012.

For the full sample of countries, I find that banking credit and market capitalization both matter for increasing bilateral trade values. In addition, I find that banking has a heterogeneous effect on bilateral trade: in countries with lower stock market development, bank credit affects trade more than in countries with high stock market development. This suggests, in the absence of well-developed stock markets, countries rely more on the banking sector, and substitution occurs as the stock market develops. For the poor

exporters' sample, I find that both financial variables matter for increasing trade, and there is weak evidence of the heterogeneous impact of bank credit, especially, because countries in those sample are relatively less developed economically and financially. The equity markets in those countries have not developed enough for that substitution to occur. Finally, for the non-poor exporters' sample, again both financial variables matter for increasing bilateral trade, and since the coefficients are comparable, I find some evidence suggesting that equity matters more than debt especially when non-poor countries are trading with other non-poor countries. Ample evidence indicates a heterogeneous effect of bank credit at various levels of capitalization.

Novel evidence suggests that in poor countries, banks and stock markets are complements rather than substitutes. This is consistent with theoretical literature that suggests that it is important for poor countries to establish banking sectors first, and establishment of equity markets are reinforced in the presence of well-developed banking sectors. I find additional evidence that suggests that capitalization matters for increasing bilateral trade on the importer side when the importer is a non-poor country, regardless of the exporter being poor or non-poor.

Lastly, to measure robustness of this model that does not allow utilizing time-varying country-specific fixed effect, this paper uses a novel method proposed in Heid et al. (2017a) to identify the impact of the two financial variables on bilateral trade flows. I find evidence that partially supports the conclusions from the main model. I find that banking credit and market capitalization do indeed both matter for increasing bilateral trade flows, and estimations of the effects of financial systems on trade should include both these variables to allow for the distinct effects that they have on international trade.

2.10 Tables

Table 2.1: Summary Statistics of Variables of Interest: Full Sample

Variable	Obs	Mean	Std. Dev.	Min	Max
Export	59,834	10.852	3.415	-6.908	19.680
BankCredit_i	59,834	4.026	0.803	-1.681	5.521
BankCredit_j	59,834	3.990	0.821	-1.681	5.494
MarketCap_i	59,834	3.672	1.086	-3.080	7.134
MarketCap_j	59,834	3.646	1.111	-3.080	7.134
WTO	59,834	0.852	0.355	0	1
EIA	59,834	0.962	1.571	0	6
Population	59,834	16.713	1.614	0	21.019
GDP	59,834	25.758	1.747	0	30.375
Remoteness Indices:					
- Exporters	59,834	23.615	0.317	0	24.008
- Importers	59,834	23.339	0.432	0	23.959

Note: All non-categorical variables are in natural logs as in the regressions. *i* and *j* have been used to denote exporters and importers, respectively.

Table 2.2: Correlations between Financial Variables and GDP: Exporters

	$BankCred_i$	$MarketCap_i$	$LnGDP_i$
$BankCred_i$	1		
$MarketCap_i$	0.6217	1	
$LnGDP_i$	0.4315	0.4028	1

Table 2.3: Panel Gravity Regressions of Finance and Trade

Variable	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) PPML	(6) OLS
BCred_i	0.0276	0.0259	0.381***	0.381***	0.238***	0.427***
	(0.021)	(0.021)	(0.059)	(0.059)	(0.078)	(0.061)
BCred_j				0.031	0.019	0.050
				(0.049)	(0.059)	(0.055)
MCap_i		0.0357**	0.442***	0.444***	0.374***	0.507***
		(0.017)	(0.062)	(0.062)	(0.120)	(0.065)
MCap_j				0.0878	0.166**	0.0107
				(0.055)	(0.075)	(0.061)
BCred_i*MCap_i			-0.112***	-0.112***	-0.0662**	-0.136***
			(0.016)	(0.016)	(0.030)	(0.017)
BCred_j*MCap_j				0.00232	-0.00132	0.0245
				(0.014)	(0.018)	(0.016)
Marginal Effect of BankCred_i:						
At P10: MCap_i			0.127***	0.128***	0.089***	0.121***
			(0.028)	(0.028)	(0.027)	(0.029)
At Med: MCap_i			-0.040*	-0.039*	-0.009	-0.081***
			(0.021)	(0.021)	(0.046)	(0.024)
At P90: MCap_i			-0.173***	-0.171***	-0.087	-0.241***
			(0.032)	(0.032)	(0.078)	(0.037)
Pair FE	Yes	Yes	Yes	Yes	Yes	No
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Exp. & Imp. FE	No	No	No	No	No	Yes
N	59834	59834	59834	59834	60118	59834
R-sq	0.936	0.936	0.937	0.937		0.808

Notes: Standard errors are clustered by bilateral pairs. Standard errors are in parentheses with ***, **, and * denoting significance at the 1%, 5%, and 10% levels respectively. The dependent variable is the ln of annual bilateral trade value, except for (5), where the trade value is not logged. All specifications include logs of GDP and population of both exporter and importer countries, remoteness indexes, WTO, and EIA as control variables. Regression (6) includes traditional gravity covariates like ln of bilateral distance, common currency etc.

Table 2.4: Impact of Finance on Trade: Poor vs Non-Poor Exporting Countries

Variable	(1)	(2)
Exporters:	Poor	Non-Poor
BankCredit_i	0.400***	0.517***
	(0.098)	(0.080)
BankCredit_j	0.0771	0.0261
	(0.128)	(0.052)
MarketCap_i	0.302**	0.619***
	(0.118)	(0.092)
MarketCap_j	0.157	0.0943
	(0.132)	(0.060)
BankCredit_i*MarketCap_i	-0.084***	-0.149***
	(0.031)	(0.023)
BankCredit_j*MarketCap_j	-0.0203	-0.00012
	(0.035)	(0.015)
Marginal Effect of BankCredit_i:		
At P10: MarketCap_i	0.256***	0.121***
	(0.079)	(0.025)
At Median: MarketCap_i	0.141	-0.072***
	(0.086)	(0.022)
At P90: MarketCap_i	0.039	-0.230***
	(0.106)	(0.041)
N	14,575	45,045
R-sq	0.913	0.948

Notes: Standard errors are clustered by bilateral pairs. Standard errors in parentheses with ***, **, and * denoting significance at the 1%, 5%, and 10% levels respectively. The dependent variable is the ln of annual bilateral trade value. All specifications include logs of GDP and population of both exporter and importer countries, and WTO, EIA, and remoteness indexes as control variables.

Table 2.5: Impact of Finance on Trade: Poor Exporting Countries

Variable	(1)	(2)	(3)
Importers:	All	Poor	Non-poor
BankCred_i	0.400***	0.545***	0.367***
	(0.098)	(0.191)	(0.116)
BankCred_j	0.0771	-0.191	0.242
	(0.128)	(0.171)	(0.199)
MCap_i	0.302**	0.586**	0.149
	(0.118)	(0.233)	(0.146)
MCap_j	0.157	-0.265	0.379*
	(0.132)	(0.163)	(0.220)
BankCred_i*MCap_i	-0.084***	-0.191***	-0.0296
	(0.031)	(0.062)	(0.037)
BankCred_j*MCap_j	-0.0203	0.1000**	-0.0769
	(0.035)	(0.045)	(0.056)
Marginal Effect of BankCred_i:			
At P10: MCap_i	0.256***	0.224	0.316***
	(0.079)	(0.146)	(0.102)
At Median: MCap_i	0.141	-0.029	0.275**
	(0.086)	(0.157)	(0.117)
At P90: MCap_i	0.039	-0.259	0.240*
	(0.106)	(0.198)	(0.145)
N	14,575	3,826	10,698
R-sq	0.913	0.905	0.920

Notes: Standard errors are clustered by bilateral pairs. Standard errors in parentheses with ***, **, and * denoting significance at the 1%, 5%, and 10% levels respectively. The dependent variable is the ln of annual bilateral trade value. All specifications include logs of GDP and population of both exporter and importer countries, and WTO, EIA, and remoteness indexes as control variables.

Table 2.6: Marginal Effect of Banking at Percentiles of Capitalization: Poor Exporters

	Poor Exporter		
	Exporter	Capitalization	Marginal Effect
Poor Importer	Nigeria	2.252	0.116
			(0.145)
	Philippines	4.299	-0.274
			(0.202)
	Exporter	Capitalization	Marginal Effect
Non-Poor Importer	Nigeria	2.252	0.301
			(0.105)
	Philippines	4.299	0.240*
			(0.145)

Table 2.7: Impact of Finance on Trade: Non-Poor Exporting Countries

Variable	(1)	(2)	(3)
Importers:	All	Poor	Non-poor
BankCred_i	0.517***	0.519***	0.498***
	(0.080)	(0.190)	(0.090)
BankCred_j	0.0261	0.0869	0.036
	(0.052)	(0.085)	(0.084)
MCap_i	0.619***	0.497**	0.639***
	(0.092)	(0.219)	(0.103)
MCap_j	0.0943	-0.174**	0.204**
	(0.060)	(0.083)	(0.104)
BankCred_i*MCap_i	-0.149***	-0.126**	-0.151***
	(0.023)	(0.053)	(0.026)
BankCred_j*MCap_j	-0.00012	0.0606**	-0.017
	(0.015)	(0.024)	(0.025)
Marginal Effect of BankCred_i:			
At P10: MCap_i	0.121***	0.171***	0.097***
	(0.025)	(0.056)	(0.029)
At Median: MCap_i	-0.072***	0.013	-0.099***
	(0.022)	(0.046)	(0.025)
At P90: MCap_i	-0.230***	-0.121	-0.258***
	(0.041)	(0.090)	(0.046)
N	45,045	11,487	33,416
R-sq	0.948	0.937	0.953

Notes: Standard errors are clustered by bilateral pairs. Standard errors in parentheses with ***, **, and * denoting significance at the 1%, 5%, and 10% levels respectively. The dependent variable is the ln of annual bilateral trade value. All specifications include logs of GDP and population of both exporter and importer countries, and WTO, EIA, and remoteness indexes as control variables.

Table 2.8: Marginal Effect of Banking at Percentiles of MCap: Non-Poor Exporters

	Non-Poor Exporter		
	Exporter	Capitalization	Marginal Effect
Poor Importer	Cyprus	2.337	0.139
			(0.075)
	Luxembourg	4.725	-0.034
			(0.070)
	Exporter	Capitalization	Marginal Effect
Non-Poor Importer	Cyprus	2.337	0.032
			(0.035)
	Luxembourg	4.725	-0.131**
			(0.042)

Table 2.9: Panel Regressions: Using International & Intra-national Trade Flows

	(1) OLS_Int	(2) PPML_Int	(3) OLS_Int	(4) PPML_Int
International	-11.23***	-8.374***	0	0
	(1.22)	(0.47)	(.)	(.)
BankCred_i*International	1.173***	0.911***	-0.0277	-0.00104
	(0.31)	(0.12)	(0.14)	(0.07)
MCap_i*International	0.651***	0.184**	0.140**	0.122***
	(0.25)	(0.08)	(0.07)	(0.03)
Intra-national Trade Flows	Yes	Yes	Yes	Yes
Exp- & Imp-time FE	Yes	Yes	Yes	Yes
Pair FE	No	No	Yes	Yes
N	44762	45885	44594	45636
R-sq	0.868		0.957	

Notes: Standard errors are clustered by bilateral pairs. Standard errors in parentheses with ***, **, and * denoting significance at the 1%, 5%, and 10% levels respectively. The dependent variable is the ln of annual bilateral trade value for Regressions (1) and (3), and trade value (not logged) for Regressions (2) and (4). All specifications include standard gravity covariates.

Chapter 3 Finance, Growth, and Poverty: The Role of Financial Inclusion

3.1 Introduction

A large empirical literature on the finance-growth nexus has examined the impact of financial systems on economic growth. Substantial empirical evidence suggests that there is a positive relationship between financial development and economic growth to the extent that Nobel Laureate Merton Miller (1998) stated that the contribution of financial development to growth is "too obvious for serious discussion". Yet another body of empirical literature led by Nobel Laureate Robert E. Lucas Jr (1988) finds the relationship to be inconclusive and overstated. Despite the arguments put forward by the latter line of thought, a large body of literature has identified the importance of financial sector development for flourishing economic performance. However, fewer papers have focused on how the distribution of financial development affects economic performance and welfare i.e. how an increase in the usage of basic financial products in an economy affects economic growth and overall well being, given a certain level of financial development.

According to the Global Findex 2017 database, close to one-third of adults (1.7 billion people) remain unbanked, meaning that they do not have access to financial services provided by banks or financial institutions. The World Bank promotes financial inclusion as a key component of reducing poverty and inequality and boosting economic performance. Initial data analysis shows strong correlations between measures of economic well-being and financial inclusion. Countries with higher levels of real GDP per capita like the US ($53129) and Austria ($49129) tend to have more people having bank accounts at 93% and 98% of the sample in 2017, respectively. In contrast, countries with lower levels of real GDP per capita like Zambia ($1635) and Vietnam ($1835) tend to have fewer people having bank accounts at 46% and 31% of the sample in 2017, respectively. A middle-income country like China has a real GDP per capita of $7529 with 80% of the recorded sample having an account at a bank or financial institution in 2017.[1] Overall, the percentage of people with an account at a bank or a financial institution has a correlation of 0.725 with real GDP per capita. Since 2011, great accomplishments have been made by international organizations like the World Bank and the IMF towards financial inclusion by increasing access to 1.2 billion adults worldwide. One example would be efforts made by the World Bank to foster sustainable financial inclusion through successful completion of a program, *Jeevika* in Bihar, India. This project created commercial banks linkages in

[1] All data are in 2010 constant US$.

the poorest areas of Bihar by providing access to credit through commercial banks. The financial inclusion project has facilitated social mobilization of poor households into institutions managed by the community or self-help groups, fostered thrift and savings, and provided financial literacy and counseling services. This has caused several commercial banks to partner with the project, thus creating room for further sustainable developments in financial inclusion. Simultaneously, the project also worked with local financial institutions to make them for responsive to the needs of their clients. Another example is a World Bank project in Mexico between 2012 and 2017 managed through the International Bank for Reconstruction and Development and other partner agencies that provided large-scale loans to initiate financial inclusion efforts in Mexico. This project aimed to expand access to financial services in rural areas and install cheaper and easier processes of making deposits and payments, and withdrawing money. These efforts improved its credit and savings institutions by expanding their financial services to target women and underprivileged and indigenous populations in rural areas. Specifically, these improvements included wider availability of banking agents, service points of access to financial services, deposit insurance, and financial education.

The progression of this field of work on development of the financial sector originally accelerated in the 1980s and 1990s with increased availability of data. As more data on financial inclusion has become available, understanding the impact of financial inclusion on economic growth and poverty alleviation, and how financial development impacts growth and poverty has become important. Financial inclusion represents the latest policy objective in the debate for the importance of finance towards economic development and poverty reduction. Financial inclusion provides an insight into the distribution of financial access across different countries and how the financial system has evolved to have a positive impact on economic growth and overall poverty alleviation.

A primary advantage of financial sector development is the reduction of credit constraints, since such constraints may slow aggregate economic growth by preventing finance from flowing to the most productive entrepreneurs. While the bulk of the discussion on financial development looks at its impact on growth, the potential impact on income distribution and poverty is also important. The relationship between financial development and poverty alleviation could be indirectly linked to economic growth because the distribution of income can influence savings decisions and the allocation of resources. On the one hand, this leads to some theories by Banerjee and Newman (1993), Galor and Zeira (1993), and Aghion and Bolton (1997) claiming that financial development will have a disproportionately beneficial impact on the poor stemming from an elimination of credit constraints that restrict the poor from exploiting investment opportunities. In

addition, the presence of these credit constraints allows higher income inequalities across and within different countries by keeping capital from flowing to entrepreneurs with a lack of wealth. On the other hand, Lamoreaux (1996) and Haber (1991, 2004, 2005) argue that the benefits of financial development and availability of external finance are primarily enjoyed by the rich and the connected, leading to capital being channeled towards a selected few.

However, some models such as that by Banerjee and Newman (1993) also assert a non-linear relationship between financial development and income inequality, giving rise to an inverted U-shaped relationship between the two. At low levels of financial development, as financial development increases, inequality increases, but there is a level of financial development beyond which further increases result in decreased inequality. Furthermore, some studies find a non-linear relationship between financial development and growth, where the impact of finance on growth depends on how developed the financial sector is. Bencivenga et al. (1995) discuss the possible nonlinearities associated with the relationship between financial development and economic growth by introducing transaction costs of financial activities into their model: economies with lower transaction costs in financial markets will eventually experience enhanced growth and economies that are unable to lower those transaction costs will experience slower growth. Minier (2003) finds that there is a threshold below which there is little effect of financial development on growth. Moreover, papers like Rioja and Valev (2004b) seek to quantify the threshold level of financial development below which financial depth does not affect growth.

While non-linearities in the relationships between financial development and economic growth, and poverty have been discussed in literature, much of the work concentrated on how the relationships evolve based on the level of financial development. Little work has focused on how these relationships would be affected by the level of *financial inclusion*. "Financial inclusion is a measure of individuals' access to formal financial products and services that meet their needs sustainably and affordably in a well-regulated environment", as defined by Demirguc-Kunt et al. (2017). While financial inclusion theoretically ranges from having a bank account to access to more sophisticated financial instruments like insurance, most cross-country data simply measure the percentage of the population with access to a bank account, a savings account or a loan to operate or start a business or a farm.

This paper analyses how the impact of overall financial development in a country impacts economic growth and poverty at different levels of financial inclusion. To measure financial development, I use domestic credit to the private sector as a percentage of GDP, as it is the most widely used measure in empirical literature. For this paper, I consider

three basic financial inclusion variables: the percentage of people with bank accounts, the percentage of people who saved at and the percentage of people who borrowed from formal financial institutions. Financial development and financial inclusion variables are both introduced into growth and poverty equations, along with an interaction term between financial development and financial inclusion variables in addition to a set of conditioning variables including an index of human capital, growth rate of population, and gross capital formation. The aforementioned interaction term allows the marginal effect of financial development to vary with financial inclusion.

This paper finds evidence of nonlinearities in the relationships between growth and finance variables, and poverty and the finance variables. Countries with less developed financial infrastructures are more likely to see growth rates rise following an increase in financial development while growth is less likely to increase in countries with already developed financial infrastructures. The results are consistent across all financial inclusion variables. In the case of poverty as the dependent variable, the outcomes are not the same across all inclusion variables. Poverty is more likely to decrease in countries with fewer people having bank accounts and savings following an increase in financial development, but this effect does not occur when the measure of financial inclusion is borrowing to start a business or farm.

Section 2 discusses the papers associated with financial development and financial inclusion, growth and poverty literature. Section 3 goes on to discuss the data sets and methodology utilized in this analysis. Section 4 presents the empirical results and Section 5 concludes.

3.1.1 Literature Review

It is widely acknowledged that finance plays a crucial role in the process of economic growth by facilitating the mobilization of capital as supported by Bagehot (1873); spurring technological progress by reallocating investment funds to those entrepreneurs with the best chances of successfully implementing new ideas as explained by Ang (2011) and Ilyina and Samaniego (2011); increasing productivity growth as described by King and Levine (1993), Levine and Zervos (1998), and Ilyina and Samaniego (2011); and increasing investment in physical and human capital as supported by King and Levine (1993). However, studies like Zingales (2015) have urged against the rent-seeking activities associated with excessive financial advancement to the extent that Schularick and Taylor (2012) and Mian and Sufi (2015) mention such activities potentially creating the foundations for future financial crises with adverse implications for long-term growth and social welfare.

The theoretical literature provides conflicting predictions concerning the association

between financial development and poverty alleviation. Some studies like Banerjee and Newman (1993), Galor and Zeira (1993), and Aghion and Bolton (1997) claim that credit constraints may slow aggregate growth by keeping capital from flowing to its most productive uses thus restricting the poor from exploiting investment opportunities. Therefore, financial intermediary development will have a disproportionately beneficial impact on the poor. However, Lamoreaux (1996) and Haber (1991, 2004, 2005) argue that it is primarily the rich and connected who benefit from improvements in the financial system, especially at early stages of development. Other models posit a non-linear relationship between financial development and inequality and poverty alleviation depending on the level of financial development. Greenwood and Jovanovic (1990) describe how rising income widens income inequality in the earlier stages of development, however, attains a more equalized distribution of income when the financial structure becomes more developed.

3.2 Data and Methodology

3.2.1 Data

The analysis in this paper aims to extract the impact of financial inclusion on economic growth and poverty, accounting for the level of financial development. The data for real GDP and population have been sourced from World Development Indicators, World Bank. The data on gross capital formation (previously known as gross domestic investment) as a percentage of GDP has been retrieved from the World Bank database which measures the additions to the fixed assets in an economy plus the changes to the level of capital inventories. The human capital index to measure the overall level of non-physical capital in an economy has been retrieved from the Penn World Tables 9.1 based on the average years of schooling from Barro and Lee (2013) and an assumed rate of return to education, based on Mincer equation estimates. For the impact on poverty, I use poverty headcount ratio at $5.50 a day as a percentage of the population (*povhead550*)[2]. The percentage of the population living on less than $5.50 a day, the most generous definition of poverty headcount ratio, is appropriate because a wider access to financial services is more likely to affect those living above the subsistence level. All poverty variables have been sourced from World Bank's Poverty and Equity data portal.

This paper primarily uses three financial inclusion variables, all from the Global Financial Inclusion Indicators database, World Bank: *Accounts*, the percentage of respondents

[2]Other measures of poverty like poverty gap have been used to do the same analysis for robustness checks, which appear in the appendix.

over the age of 15 years who reported having an account (by themselves or together with someone else) at a bank or another type of financial institution or reported personally using a mobile money service in the past 12 months; *Savedfin*, the percentage of respondents over the age of 15 years who reported saving or setting aside any money at a bank or another type of financial institution in the past 12 months; and *Borrow*, the percentage of respondents over the age of 15 years who reported borrowing any money to start, operate, or expand a farm or business in the past 12 months. Owing to the unavailability of data for the financial inclusion variables, most of my analysis is restricted to years 2011, 2014, and 2017. Financial development across countries is measured by domestic credit to the private sector by banks as a percentage of GDP (also referred to as bank credit).

Tables 1 and 2 illustrate the summary statistics of the variables used in this paper for both the all-country and developing-country samples, respectively. The tables show the average differences in financial standing between the all-country and developing-country samples: while bank credit is 56.6% in the all-country sample, it is at 42.6% for the developing one; while the percentage of people with a bank account was 55.6% in the all-country sample, it was 42.6% in the developing one; while the percentage of people who reported saving at a financial institution was 22.7% in the all-country sample, it was 15.3% in the developing one. However, surprisingly, a higher percentage of people reported borrowing money in the developing sample at 8.3% than in the all-country sample at 6.7%. This points towards the variation in levels of financial inclusion across countries at different levels of economic development. It is also important to discuss the changes in average levels of financial inclusion over time, due to efforts made by international organizations and subsequent attainments in increasing access to financial products in several countries.

On average, the three financial inclusion variables have increasing trends at decreasing rates. Over time, the percentage of respondents reporting having an account increased from approximately 46.2% in 2011 to 61.4% in 2017, on average. The increasing trends in the other two financial inclusion variables are more modest. On average, the percentage of respondents reported saving or setting aside any money at a bank or another type of financial institution increased from approximately 18.7% in 2011 to 23.6% in 2017; while the percentage of respondents who reported borrowing increased from approximately 6.5% in 2014 to 6.8% in 2017, on average.

Figure 1 plots the percentage of respondents who reported having an account in 2017 to corresponding real GDP per capita. This figure indicates that higher incomes are positively correlated with the percentage of people in a country using basic financial products, but also points towards a possible non-linear relationship between the two variables.

In the following, all regressions include the log of the financial development variable.

In addition, all regressions also include a human capital index (an index based on years of schooling and returns to education from the Penn World Tables 9.1), the growth of population, gross capital formation as a percentage of GDP, and initial GDP as control variables to capture cross country differences. The latter two variables are from World Development Indicators, World Bank.

This paper investigates whether financial development and financial inclusion act as substitutes for one in their relationship with economic growth and income. Table 2 shows the correlations between financial development and the financial inclusion measures: while financial development seems to have strong and somewhat strong relationships with *Accounts* and *Savedfin* respectively, financial development seems to have a negative correlation with *Borrow*. *Borrow* has a negative correlation with the other two financial inclusion variables as well. This indicates that we may expect the borrowing variable to affect economic growth and poverty differently than the other two financial inclusion variables. This is intuitive because an increase in deposit accounts and savings accounts means better facilitation of day-to-day life which helps families and businesses plan for everything from long-term planning to unexpected emergencies, leading to increase in overall economic growth and lower poverty. However, borrowing (especially by the ultra-poor) is associated with other risks of returning loanable funds and paying regular interest, which eventually may depend on the success of the business. Hence, borrowing is likely to affect the outcome variables differently than accounts or savings.

3.2.2 Empirical Setting

The goal of this paper is to examine how financial inclusion affects the relationship between financial development and economic growth. Minier and Unel (2013) incorporated interaction terms into traditional growth regressions in their examination of nonlinearities between trade policy and economic growth. Following their idea, this paper introduces interaction terms between financial development and financial inclusion to allow the estimated implied marginal impact of financial development on the outcome variable to differ between countries with different levels of financial inclusion. I extend the traditional growth regression literature by estimating the following unbalanced panel specification for the three financial inclusion variables:

$$growth_{i,t} = \beta_0 + \beta_1 fin\_dev_{i,t} + \beta_2 fin\_inc_{i,t} + \beta_3 (fin\_dev * fin\_inc)_{i,t} + \beta_x X_{i,t} + \lambda_t + \epsilon_{i,t} \tag{3.1}$$

where $growth_{i,t}$ denotes the average annual growth rate in real GDP per capita in country *i* from time *t* to *t+1*. $Fin\_Dev_{i,t}$ and $Fin\_Inc_{i,t}$ denote the level of financial development and financial inclusion in country *i* at time *t*, respectively. The variable $X_{i,t}$ denotes the set of conditioning variables that establish country characteristics in growth regressions. This set includes the human capital index to account for differences in human capital across countries that affect the growth rate, the population growth rate that accounts for the growth rate of the labor force that is correlated with the growth rate, and gross capital formation as a percentage of GDP to account for different levels of capital accumulation that affect the growth rate, and initial GDP. $\epsilon_{i,t}$ denotes the random error term.

In order to assess the impact of financial development and inclusion on poverty, I estimate the following unbalanced panel specification for the three financial inclusion variables:

$$poverty_{i,t} = \beta_0 + \beta_1 fin\_dev_{i,t} + \beta_2 fin\_inc_{i,t} + \beta_3 (fin\_dev * fin\_inc)_{i,t} + \beta_x X_{i,t} + \lambda_t + \epsilon_{i,t} \tag{3.2}$$

where $poverty_{i,t}$ denotes the poverty rate in country *i* at time *t*. $Fin\_Dev_{i,t}$ and $Fin\_Inc_{i,t}$ denote the level of financial development and financial inclusion in country *i* at time *t*, respectively. The variable $X_{i,t}$ denotes the set of conditioning variables that establish country characteristics. This set includes the human capital index, the population growth rate, gross capital formation as a percentage of GDP, and initial GDP. $\epsilon_{i,t}$ denotes the random error term.

The above regression does not completely resemble a typical poverty regression. Although I utilized the same model to estimate effects of financial inclusion on economic growth and poverty, the explanatory variables in my regressions attempt to imitate traditional poverty regressions. The primary objective of the set of conditioning variables is to establish country characteristics, which is potentially accurate when estimating regressions for both growth and poverty. A typical poverty regression utilizes years of education and enrollment rates to account for human capital differences. However, the human capital index from Penn World Tables 9.1 is calculated based on the average years of schooling from Barro and Lee (2013) and an assumed rate of return to education. An advantage of using this human capital index that as a cross check during calculation, the trend in schooling years was also compared to enrollment data from UNESCO. Hence, the human capital index is potentially a better way of measuring education than the traditional measures. The population growth rate included in my regressions captures the effect of income inequality which is usually included in poverty regressions. Additionally,

the level of inequality is unlikely to change over such a short period of time. The effects of inflation and some trade policies can be captured using time fixed effects, which are included in my regressions.

While financial development measures the overall advancement of the financial system, financial inclusion looks at the proportion of people who actually have access to basic financial products. I expect that at lower levels of financial inclusion where people are deprived from basic financial products, an increase in financial development should have a weak or no impact on growth. Countries with a majority of people lacking access to basic financial products are usually those with more subsistence workers who are unlikely to start high-return and high-capital projects as financial development occurs. As more people have access to financial products at higher levels of financial inclusion in relatively richer countries, an increase in financial development is likely to have a stronger impact on growth as individuals in these countries are more likely to invest in high-yield high-capital projects.

In the case of poverty, it seems that at lower levels of financial inclusion, an increase in financial development will have a weaker impact on poverty alleviation owing to the theory that most of the benefits of increased access may be reaped by the rich and connected. However, as more people start having access to financial products at higher levels of financial inclusion, financial development should have a stronger impact on poverty alleviation as the reduction of credit constraints mobilizes more funds towards those who are most productive.

3.3 Empirical Results

The results for the empirical specification have been divided into two parts: the first presents the impact of financial inclusion and financial development on economic growth, and the second presents the impact on poverty. Each table presents results for three different financial inclusion variables along with an interaction variable between financial development and the corresponding financial inclusion variable in a cross-country setting. All tables are segregated between all-country samples and developing-country samples. The lower panel of all tables depict the implied marginal effect of bank credit on the corresponding dependent variable at different percentiles of the financial inclusion variable i.e. how financial development in a cross-country setting impacts the dependent variable, depending on how intensively people are using financial products.

3.3.1 Impact on Growth

Using the growth rate as the dependent variable, Table 3 presents results with all three financial inclusion variables *accounts*, *savedfin*, and *borrow* and the corresponding interaction terms between the log of financial development and each inclusion variable. Column 1 of Table 3 shows that the growth rate of per capita income is increasing in both bank credit and accounts and statistically significant at least at the 90% level, however, the interaction term is negative and statistically significant at the 95% level. Regression 2 shows that the growth rate of per capita income is increasing in both bank credit and savings and statistically significant at least at the 90% level, however, the interaction term is negative and statistically significant at the 99% level. The marginal effect of bank credit, when evaluated at the 25th percentile and median level of savings, is positive but statistically insignificant. However, with a high percentage of people saving at a financial institution, the implied marginal effect of private credit becomes negative and statistically significant at the 90% significance level. For Regression 2, marginal effects are positive and statistically significant for the lowest 13% of the sample and negative and statistically significant for the highest 73% of the sample at 90% level of significance. The negative interaction terms indicate a possible substitutability between financial development and inclusion variables. Therefore, for countries with low access to saving at a financial institution, increases in *bank credit* have little impact in reducing the growth rate; for countries at higher levels of savings, the negative impact on growth is greater.

In column 3 of Table 3, the implied marginal effects of private credit at the 25th, 50th, and 75th percentiles of borrowing are all positive and statistically significant at least at the 95% significance level; this could imply that an increase in borrowing may potentially act as a positive reinforcement towards the increasing effect of financial development on growth.[3] However, the marginal effect in this case, although increasing, does not seem to vary much as borrowing increases.

It is interesting to look at the effect of financial development and financial inclusion for developing countries only, because initiatives to improve financial inclusion have concentrated mostly within developing countries. In addition, developed countries already have very high levels of financial inclusion while the level tends to vary greatly within developing countries. Finally, one of the primary objectives of increasing financial inclusion was to improve the lives of millions of people living in poverty, which is more relevant in

[3]The regressions in Columns 1 and 2 were repeated to incorporate only observations included in the Column 3 to explore if the difference in regression outcomes is due to difference in sample size. Referring to Column 1, with limited observations *Accounts* and its corresponding interaction term loses significance unlike *Savedfin* in Column 2. The lack of significance for *Borrow* could potentially be due to limitation of number of observations.

the developing-country sample.

Table 4 repeats the analysis of Table 3 restricting the sample to only developing countries. In Regression 2, the implied marginal effect of private credit on growth at the 25th percentile is positive and statistically significant at the 95% significance level which decreases at the median, still remaining positive and statistically significant at the 90% level. The implied marginal effects of private credit at the 25th, 50th, and 75th percentiles of borrowing in Regression 3 are all statistically significant at the 99% significance level. Again, the marginal effect in case of the borrowing variable, although increasing, does not seem to vary much as borrowing increases within the developing country sample. From Table 5, it is not clear if financial inclusion affects the growth rate for developing countries since regression coefficients lack significance. This follows the conclusion by Greenwood and Jovanovic (1990) who emphasize that at early stages of financial development when the financial structure is largely unorganized, growth rates will be slow despite increases in financial development. Bencivenga et al. (1995) and Minier (2003) had similar conclusions as well.

Overall, the positive impact of financial development on growth tends to be amplified as the level of borrowing increases from the 25th to the 75th percentile while savings as a financial inclusion variable seems to have the opposite effect. As the percentage of people saving at a financial institution increases, the implied marginal effect of financial development on economic growth tends to decrease; this could because savings acts as a substitute for the level of domestic private credit in an economy.

3.3.1.1 Impact on Poverty

Using the poverty headcount ratio at $5.50 a day as a percentage of the population as the dependent variable, Table 5 presents results with all three financial inclusion variables *accounts*, *savedfin*, and *borrow* interacted with bank credit for all countries in the sample. Regression 1 shows that the poverty rate is decreasing in both accounts and bank credit and statistically significant at the 99% significance level; however, the interaction term is positive and statistically significant at the 99% level indicating that financial development reduces the headcount poverty rate when the percentage of people with bank accounts is low and financial development would have a counteracting effect on the headcount poverty rate when the percentage of people with bank accounts is high. This is evident from the implied marginal effect at the 75th percentile of accounts which is positive and statistically significant at the 99% level. For Regression 1, marginal effects are negative and statistically significant for the lowest 20% of the sample and positive and statistically significant for the highest 55% of the sample at 90% level of significance. For the savings

variable *savedfin*, regression coefficients have the same sign. However, for *borrow*, the results are opposite.

Regression 3 shows that the poverty rate is increasing in both private credit and *borrow* and the interaction term is positive, both statistically significant at the 99% level. This indicates that borrowing only reduces poverty in countries that already have high access to financial products, but this is not true for developing countries that have lower access to basic financial products. Using poverty gap at the $5.50 a day level as the dependent variable, results are similar. This could indicate a possible substitutability between financial inclusion and financial development.

Table 6 repeats the analysis of Table 5 restricting the sample to only developing countries. There is not much evidence that financial inclusion affects poverty for developing countries since all primary regression coefficients lack statistical significance. Restricting the sample to developing countries also lowers the number of observations by more than half which may have an important bearing on the results as well. It is important to stress how *Borrow*, as one of the variables measuring financial inclusion, is different from the other two financial inclusion variables. This is initially evident from its negative correlation with *Accounts* and *Savedfin* in Table 2. This difference between borrowing and the other modes of financial inclusion is further reaffirmed looking at the regression results of how borrowing effects poverty. The results from Table 5 demonstrate that while *Accounts* is negatively correlated with poverty, *Borrow* is positively correlated with poverty. It is important to note that microfinance, one of the initial modes of introducing financial inclusion, focused more on borrowing than on savings or deposit. The results, if taken literally, may have important consequences on the importance of increasing borrowing in developing countries as opposed to encouraging more savings and deposits.

Additional robustness checks with different poverty measures are attached in an appendix at the end. Most of the poverty regressions support the results in the main paper. The three poverty variables include the national poverty rate and poverty gap at $5.50 a day, in addition to the poverty headcount ratio at $5.50 a day used in the main paper. In most regressions, it is evident that *Account* and *Borrow* affect poverty in opposite directions. While having more bank accounts help in reducing poverty, increased borrowing increases poverty at least in countries with lower levels of overall financial development.

3.4 Conclusion

This paper seeks to identify how financial development and financial inclusion affect economic growth and poverty in a panel data setting. I include three financial inclusion

variables: the percentage of people with bank accounts, the percentage of people saving at a financial institution, and the percentage of people borrowing to start or operate a farm or a business. The goal of these three financial inclusion variables is to capture individual access to basic financial products in each country.

By introducing interaction terms between financial development and each financial inclusion variable into traditional growth regressions, I find evidence of nonlinearities in the relationships between growth and finance variables. Countries with less developed financial infrastructures experience an increase in economic growth rates following an increase in financial development for all countries in the sample for all three financial inclusion variables. However, growth is less likely to increase in countries with already developed financial infrastructures. In case of poverty as the dependent variable, the outcomes are not the same across all inclusion variables. Poverty is more likely to decrease in countries with fewer people having bank accounts and savings following an increase in financial development, but this effect does not occur when the measure of financial inclusion is borrowing. Moreover, borrowing only reduces poverty in countries that already have high access to financial products, but this is not true for developing countries that have lower access to basic financial services. This may potentially have important implications for the initiation and ongoing processes of microfinance policies that encourage small-scale borrowing in rural areas to improve financial conditions. Given the scope of the dataset, this paper finds that increase in borrowing is correlated with an increase in poverty for a full sample of countries.

3.5 Tables

Table 3.1: Summary Statistics

All Countries

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
Bank Credit	345	56.65	44.15	2.37	249.89
Accounts	345	55.60	30.68	1.52	100
Savedfin	345	22.69	18.26	0.29	79.33
Borrow	226	6.69	4.95	0.61	24.26
Debit	345	39.90	31.06	0.49	98.81
Credit	345	18.41	19.68	0	79.66
growthrate	345	2.54	2.56	-9.43	14.16
povpop	106	25.35	14.28	1.7	64.9
povhead550	147	22.76	26.88	0	95.8
povgap550	147	9.82	14.60	0	59.6
Human Capital	345	2.62	0.68	1.17	3.97
Population Growth	345	0.01	0.01	-0.03	0.09
Gross Capital Formation	345	24.36	7.35	11.73	58.15

Developing Countries

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
Bank Credit	250	42.63	34.79	2.37	233.21
Accounts	250	42.56	25.06	1.52	98.22
Savedfin	250	15.29	11.77	0.29	66.90
Borrow	162	8.31	4.92	1.07	24.26
Debit	250	25.93	22.19	0.49	91.85
Credit	250	10.71	14.03	0	79.66
growthrate	250	2.67	2.60	-5.75	14.16
povpop	88	26.79	15.18	1.7	64.9
povhead550	89	35.47	27.63	2.4	95.8
povgap550	89	15.38	16.46	0.5	59.6
Human Capital	250	2.37	0.60	1.17	3.97
Population Growth	250	0.02	0.01	-0.00	0.09
Gross Capital Formation	250	25.50	8.08	11.99	58.15

Note: All variables are pooled for the years 2011, 2014, and 2017.

Table 3.2: Correlation Between Measures of Financial Development and Financial Inclusion

	Financial Development	Accounts	Savedfin	Borrow
Financial Development	1			
Accounts	0.7268	1		
Savedfin	0.653	0.83	1	
Borrow	-0.4772	-0.5235	-0.3709	1

Table 3.3: Impact on Growth: All Countries

	(1)	(2)	(3)	(4)
lnitial GDP Per Capita	-0.896***	-0.935***	-0.778***	-1.098***
	(0.205)	(0.189)	(0.204)	(0.229)
Financial Development	0.567*	0.609**	0.647*	0.45
	(0.337)	(0.301)	(0.359)	(0.634)
Accounts	0.058**			-0.032
	(0.024)			(0.046)
Interaction - Accounts	-0.011**			0.009
	(0.006)			(0.011)
Savedfin		0.171***		0.181*
		(0.051)		(0.094)
Interaction - Savedfin		-0.034***		-0.034
		(0.011)		(0.021)
Borrow			0.079	-0.031
			(0.112)	(0.141)
Interaction - Borrow			0.002	0.022
			(0.033)	(0.043)
Human Capital	0.785**	0.832**	0.357	0.237
	(0.350)	(0.349)	(0.334)	(0.349)
Population Growth	-38.537**	-41.798**	-84.598***	-81.092***
Gross Capital Formation	0.084***	0.083***	0.066***	0.058***
	(0.022)	(0.022)	(0.016)	(0.016)
Implied Marginal Effect of Financial Development:				
At Q25	0.240	0.312	0.653**	
	(0.252)	(0.252)	(0.290)	
At Median	-0.035	0.056	0.658***	
	(0.244)	(0.233)	(0.240)	
At Q75	-0.409	-0.492*	0.665***	
	(0.334)	(0.279)	(0.218)	
Observations	345	345	226	226
R-squared	0.229	0.241	0.288	0.323

Note: Standard errors in parentheses are adjusted for heteroscedasticity. All regressions include time fixed effects. Dependent variable is the growth rate of real GDP per capita. Marginal effects are estimated at Q25, Median, and Q75 of the included financial variable (i.e., Accounts in Regression 1, Savedfin in Regression 2, and Borrow in Regression 3).
* p¡0.1 ** p¡0.05 *** p¡0.01

Table 3.4: Impact on Growth: Developing Countries

	(1)	(2)	(3)	(4)
lnitial GDP Per Capita	-0.934***	-0.913***	-1.044***	-1.148***
	(0.214)	(0.200)	(0.215)	(0.239)
Financial Development	0.670*	0.719**	0.833**	0.448
	(0.355)	(0.317)	(0.394)	(0.731)
Accounts	0.037			0.003
	(0.030)			(0.065)
Interaction - Accounts	-0.006			-0.001
	(0.007)			(0.017)
Savedfin		0.122*		0.007
		(0.067)		(0.138)
Interaction - Savedfin		-0.023		0.006
		(0.014)		(0.033)
Borrow			0.058	-0.032
			(0.121)	(0.157)
Interaction - Borrow			0.012	0.034
			(0.037)	(0.050)
Human Capital	0.623	0.699*	0.105	0.054
	(0.388)	(0.395)	(0.378)	(0.389)
Population Growth	-37.391*	-39.720*	-82.517***	-83.553***
	(20.526)	(20.605)	(19.294)	(18.566)
Gross Capital Formation	0.078***	0.077***	0.073***	0.067***
	(0.022)	(0.022)	(0.016)	(0.016)
Implied Marginal Effect of Financial Development:				
At Q25	0.542*	0.556**	0.887***	
	(0.280)	(0.271)	(0.272)	
At Median	0.433	0.438*	0.921***	
	(0.267)	(0.259)	(0.225)	
At Q75	0.310	0.269	0.963***	
	(0.315)	(0.277)	(0.229)	
Observations	250	250	162	162
R-squared	0.267	0.273	0.398	0.409

Note: Standard errors in parentheses are adjusted for heteroscedasticity. All regressions include time fixed effects. Dependent variable is the growth rate of real GDP per capita. Marginal effects are estimated at Q25, Median, and Q75 of the included financial variable (i.e., Accounts in Regression 1, Savedfin in Regression 2, and Borrow in Regression 3).
* p¡0.1 ** p¡0.05 *** p¡0.01

Table 3.5: Impact on Poverty: All Countries

	(1)	(2)	(3)	(4)
lnitial GDP Per Capita	-11.109***	-14.292***	-10.610***	-9.516***
	(2.018)	(1.881)	(2.372)	(3.286)
Financial Development	-12.304***	-7.607**	6.267**	4.141
	(4.302)	(3.018)	(2.765)	(7.311)
Accounts	-1.007***			-0.394
	(0.255)			(0.453)
Interaction - Accounts	0.226***			0.037
	(0.055)			(0.106)
Savedfin		-0.656		0.283
		(0.505)		(0.744)
Interaction - Savedfin		0.213**		-0.014
		(0.105)		(0.158)
Borrow			6.322***	5.504**
			(1.944)	(2.217)
Interaction - Borrow			-1.322***	-1.190**
			(0.476)	(0.546)
Human Capital	-7.942***	-11.029***	-1.969	-2.577
	(3.031)	(3.151)	(4.788)	(5.063)
Population Growth	315.614**	293.122**	408.276**	267.576
	(129.737)	(119.923)	(202.953)	(212.704)
Gross Capital Formation	0.106	-0.061	-0.027	-0.04
	(0.183)	(0.160)	(0.197)	(0.203)
Implied Marginal Effect of Financial Development:				
At Q25	-4.015	-5.533**	3.517*	
	(2.739)	(2.340)	(2.088)	
At Median	1.429	-4.306**	0.088	
	(2.180)	(2.074)	(1.736)	
At Q75	8.000***	-0.053	-4.609*	
	(2.481)	(2.416)	(2.472)	
Observations	147	147	83	83
R-squared	0.820	0.815	0.788	0.803

Note: Standard errors in parentheses are adjusted for heteroscedasticity. All regressions include time fixed effects. Dependent variable is the growth rate of real GDP per capita. Marginal effects are estimated at Q25, Median, and Q75 of the included financial variable (i.e., Accounts in Regression 1, Savedfin in Regression 2, and Borrow in Regression 3).
* p¡0.1 ** p¡0.05 *** p¡0.01

Table 3.6: Impact on Poverty: Developing Countries

	(1)	(2)	(3)	(4)
lnitial GDP Per Capita	-13.272***	-17.068***	-13.144***	-9.630**
	(2.481)	(2.079)	(2.820)	(3.738)
Financial Development	-3.953	-1.533	0.998	1.778
	(5.087)	(3.936)	(5.559)	(8.772)
Accounts	-0.685			-0.371
	(0.436)			(0.645)
Interaction - Accounts	0.114			0.012
	(0.107)			(0.173)
Savedfin		0.417		0.304
		(1.059)		(1.790)
Interaction - Savedfin		-0.09		-0.025
		(0.241)		(0.428)
Borrow			3.122	2.416
			(3.084)	(3.139)
Interaction - Borrow			-0.456	-0.304
			(0.835)	(0.867)
Human Capital	-9.422**	-10.452***	-2.935	-2.238
	(3.763)	(3.930)	(5.348)	(5.600)
Population Growth	602.416**	554.336**	699.340*	762.563**
	(270.374)	(267.750)	(359.243)	(370.659)
Gross Capital Formation	0.083	-0.032	-0.12	-0.06
	(0.206)	(0.195)	(0.236)	(0.273)
Implied Marginal Effect of Financial Development:				
At Q25	-1.476	-2.184	-1.204	
	(3.275)	(2.938)	(2.617)	
At Median	0.813	-2.642	-2.391	
	(2.505)	(2.723)	(2.714)	
At Q75	2.416	-2.978	-3.334	
	(2.938)	(2.902)	(3.810)	
Observations	89	89	53	53
R-squared	0.782	0.769	0.730	0.752

Note: Standard errors in parentheses are adjusted for heteroscedasticity. All regressions include time fixed effects. Dependent variable is the growth rate of real GDP per capita. Marginal effects are estimated at Q25, Median, and Q75 of the included financial variable (i.e., Accounts in Regression 1, Savedfin in Regression 2, and Borrow in Regression 3).
* p¡0.1 ** p¡0.05 *** p¡0.01

3.6 Figures

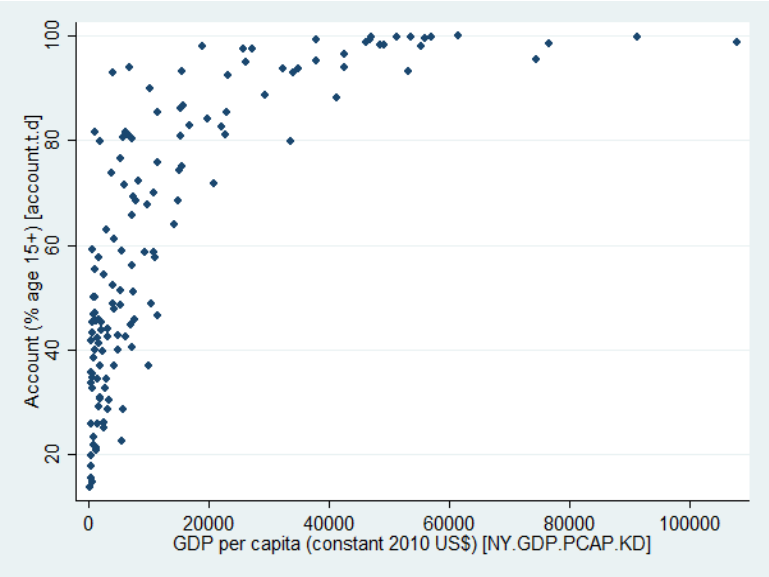

Figure 3.1: Scatter Plot of Accounts and Real GDP per Capita in 2017

Chapter 4 Financial Development and the Margins of Trade

4.1 Introduction

Disparities in domestic financial institutions are known to create comparative advantage for countries, suggesting a positive relationship between financial variables and international trade patterns. As a descendant of the finance-growth literature, the earlier research on international trade and finance, like that in Beck (2002), utilized time-varying country level data to extract the effect of finance on trade which has since then developed to include industry-level and product-level datasets, in addition to using more sophisticated versions of the gravity model of international trade to identify the impact of bilateral policy variables on trade. Countries with well-developed financial sectors tend to have higher exports in manufactured goods (Beck (2002), Beck (2003), Amiti and Weinstein (2011), Minetti and Zhu (2011)) that countries with well developed financial sectors tend to specialize in industries that require more external financing (Beck (2003), Svaleryd and Vlachos (2005)), while presence of credit constraints lower exports (Manova (2008), Minetti and Zhu (2011), Wagner (2014)).

We utilize dis-aggregated product-level trade data to identify the channel that contributes to the positive association between trade and financial development (FD from hereon). Therefore, we examine whether increases in FD correlates to countries trading a wider variety of goods or new trading relationships (extensive margin); or to an increase in existing trade relationships or trade volume (intensive margin). These adjustments along trade margins can have important consequences for trade flows. The extensive margin is positively associated with reducing volatility in the economy as well as increasing productivity (Agosin, 2007; Feenstra and Kee, 2008; Lederman and Maloney, 2003), while the intensive margin is found to be important for export growth and has been responsible for a significant portion of export growth over time (Helpman et al., 2008; Besedeš and Prusa, 2011). We also extend the analysis on trade margins across product categories. In all cases, we find that the positive impact of FD on exports is driven primarily by the extensive margin. Our results provide support to the hypothesis (for example Chaney (2008)) that financial constraint is generally associated with fixed cost to exporting. Based on our results, we are able to identify the mechanism via which FD affects exports.

Our results conclusively show that financial development increases the extensive margin of trade. In addition, the empirical estimation in this paper reveals that increases in financial development not only increases the extensive margin for all goods but also

across all product categories of primary commodities, labor-intensive and resource-based manufactures, manufactures with low skill and technology intensity, manufactures with medium skill and technology intensity, and manufactures with high skill and technology intensity. This indicates towards creation of new trading relationships across all product categories. Furthermore, increases in financial development across countries also increases the intensive margin of trade for low-tech and high-tech manufactured goods indicating towards deepening of existing trade relationships.

This paper also demonstrates whether the impact of finance on trade is dependent on a country's level of economic development. Therefore, we further disaggregate our data to address heterogeneous impact of FD on exports. We examine this impact across a country's economic size. The estimation results show that financial development increases total trade and the extensive margin the more developed the country economically while further financial development decreases the intensive margin the more developed the country. The latter result is consistent with literature that exemplifies the importance of maintaining existing trading relationships for developing countries.

Section 2 provides a background on the literature for financial development and trade and that for financial development and the extensive and intensive margins of trade. Section 3 provides a description of the data, the empirical specification, and the results.

4.2 Background

4.2.1 Financial Development and Trade

One of the earlier theoretical models explaining the link between financial institutions and international trade patterns was Kletzer and Bardhan (1987). The model shows that, even with identical technology and endowments, costs will differ between countries when funding is needed for business investments.

A number of papers in the trade literature present theoretical models to identify the impact of liquidity constraints on trade patterns. Chaney (2016) proposed a model of international trade and argued that liquidity constraints may influence the behavior of exports. If there are fixed entry costs associated with entering a foreign market, only those firms with adequate liquidity are going to export - financial underdevelopment hampers exports from other firms with liquidity constraints. Broll and Wahl (2011) present a standard hedging model of an exporting firm with liquidity constraints, and find only firms that have the necessary financial resources can fully benefit from the gains from trade. Using export flows and equity market liberalization data, Manova (2008) investigates the importance of credit constraints in determining international trade flows. By exploiting shocks

to the availability of external finance, their results show that there was a disproportionate increase in exports in sectors that used external finance more extensively following equity market liberalizations, implying that sectors were financially constrained prior to liberalization.

An even wider range of papers discuss the trade-finance link empirically. Beck (2002) explores the possible link between international trade and financial development to test for the hypothesis proposed in Kletzer and Bardhan (1987). The theoretical model describes that countries with more developed financial sectors have a comparative advantage in manufacturing industries. Utilizing both cross-section and panel data, Beck (2002) investigate the effect of financial development and find that countries with well-developed financial sectors evidently have higher shares of manufactured exports and trade balance in GDP and total merchandise exports. Using industry-level data on firms' dependence on external finance, Beck (2003) show that countries with greater dependence on external sources of finance have higher trade shares and higher trade balances within industries that use external finance more intensively. Considering the function of financial markets and intermediaries as a factor of production, Svaleryd and Vlachos (2005) also find that countries with well developed financial sectors tend to specialize in industries that require more external financing.

Hur et al. (2006) use industry-level data in their analysis and find that increase in financial development leads to increased export shares and trade balance in industries with more intangible assets. They explain that countries with well-developed financial sectors tend to enjoy a comparative advantage in industries with more intangible assets while poorly-developed financial sectors have a comparative advantage in sectors with more tangible assets.

Minetti and Zhu (2011) uses detailed survey data conducted by the Italian banking group Capitalia in 2001 on Italian manufacturing firms to estimate the impact of credit rationing on firm exports. The authors contend that liquidity constraints arising from credit rationing appears to impact both the intensive and extensive margins of trade: it lowers the probability that firms export and firm-level exports, conditional on exporting. The impact of credit rationing on foreign sales appears to be more pronounced than that of domestic sales, implying a negative impact on firm exports. The impact of credit rationing is stronger for high-tech industries and those that use external finance more intensively. Using manufacturing data on German firms, Wagner (2015) contributes to the literature by evaluating the relationship between credit constraints and number of goods exported and the number of destination countries for 3453 West German firms in 2009. Financial constraints faced by firms is measured using credit rating scores by *Creditreform*, which

is heavily used by banks to check for creditworthiness of firms. Estimation results, in line with their theoretical predictions, show that credit constraints have a negative impact on both number of goods exported and number of destinations exported to by German firms.

Based on the assumption that there are upfront costs and investments are associated with international trade flows, Becker et al. (2012) predict that increase in financial development increases trade. Using the gravity equation for international trade as a starting point, they find that finance is more important for country pairs when fixed costs are high. Industry-level data analysis further confirms their prediction and also finds that finance has a larger positive effect on exports for industries with differentiated goods, and those that use more advertising and R&D.

Ma and Xie (2019) incorporates financial development conditions for both exporting and destination country in each country-pair to investigate if financial conditions of both affect international trade between them. They find that financial development of the destination country increases the variety of goods being exported (extensive margin) and increases the volume of goods being exported (intensive margin).

4.2.2 Trade Margins and Financial Development

Combining the previous discussion entails that Financial Development is positively correlated with exports. However, the existing literature has left some interesting questions unanswered. Recent developments in theoretical models of trade that have emphasized firm-level productivity and size differences in the trade structure (Clerides et al., 1998; Bernard and Jensen, 1999, 2004; Eaton et al., 2004). This "new-new trade model" suggests that incorporating such firm-level heterogeneity leads to a decomposition of trade into two margins of trade: the number of exporters selling in the destination market or the firm-level extensive margin and the change in the average exports by firms that already export or the firm-level intensive margin (Melitz, 2003; Helpman et al., 2008; Chaney, 2008; Dutt et al., 2013).

Theoretical predictions (Melitz, 2003; Chaney, 2008) imply that only a subset of firms will export at a given level of trade costs as these firms vary by productivity. These trade costs categorized into fixed (e.g. communication cost, information cost, bureaucratic paperwork costs, marketing cost) and variable costs (e.g. reduction in tariff), entail that only more productive firms will find it profitable to export. The profitability of exports also varies by destination. Multiple studies have examined the consequences of trade liberalization on these margins (Eaton and Kortum, 2002; Melitz, 2003; Bernard et al., 2007; Chaney, 2008). None of these studies, however have examined the impact of financial

development on the margins of trade using dis-aggregated product level trade data. Our study looks specifically at the impact of financial development along these margins.

Changes to the extensive and intensive margins of trade occur due to different motivations. Dutt et al. (2013) show that a reduction in fixed costs reduces the productivity threshold that a firm must exceed before their entry into the export market. Consequently, more firms enter the market, which increases the extensive margin. However, the intensive margin decreases because increases in entry without change in prices, leads to a dilution of the market shares for the incumbent firms. The new entrants, as Dutt et al. (2013) argue, are relatively less productive (otherwise they would already be exporting) and sell less than incumbent firms. This leads to lower average productivity and lower average sales, thus the intensive margin decreases. A reduction in variable costs would also increase the extensive margin as the threshold productivity level decreases. As for the intensive margin, there are two opposing effects. First, there is an increase in revenue for the incumbent firms, hence exports and average exports per firm increases. Second, there is also entry by firms with lower productivity and lower sales than the incumbents, which decreases the average exports per firm. Dutt et al. (2013) state that when productivities (and hence revenues) follow a Pareto distribution, the average does not change as these two effects cancel each other out.[1]

The Melitz (2003) model, based on the assumption of a pareto-distribution for firm productivity, indicates that all adjustments in trade flows occurs at the extensive margin. Subsequent work has indicated that the assumption of the distribution of exporters' productivity may be of critical importance in this regard. Dutt et al. (2013) and more recently Fernandes et al. (2018) show that the firm-level heterogeneity common in the new trade models can lead to changes in trade at both the extensive and intensive margins. Such studies have criticized the pareto distribution assumption in the Melitz (2003) model as being more tractable than realistic. Sun et al. (2011) find that the Pareto distribution with unbounded productivities is a poor fit for the distribution of Chinese firms. A distribution of exporters that is not Pareto normal may tend to changes in trade flows that are more along the intensive margin. This point is reinforced by Fernandes et al. (2018) which indicates that the intensive margin of trade may be much more important than previously realized. Fernandes et al. (2018) find intensive margin to be an important component in determining trade flows while moving from a Pareto to a log-normal distribution. Deviating from the pareto-distribution assumption, Dutt et al. (2013) show that a reduction in variable costs leads to an increase in the intensive margin under two scenarios. The first

[1] Lawless (2010) finds that the intensive margin is unaffected by a change in variable costs under this assumption.

assumption places an upper bound on firm productivity or a lower bound on marginal costs, the second assumes that lower-productivity firms can have not only higher variable costs but also higher fixed costs. Both of these scenarios limit the market entry for firms, and the intensive margin increases with decreasing variable cost. Our current study of financial development on trade flows and the decomposition of these flows into the two relevant margins of trade would represent an improvement in our understanding of how it influences trade flows.

4.3 Data and Estimation

Although few studies have examined the impact of FD on trade using the gravity model, they have not been typically employed in the literature with disaggregated trade data. In order to investigate the effects of financial development on international trade, this paper uses three trade variables: total bilateral export volume, the extensive margin, and the intensive margin. We, therefore examine the empirical association between total export, the intensive, and extensive export margins and FD. Utilizing the traditional log-linear gravity model of trade augmented with the FD variable, and estimated by the Ordinary Least Squares (OLS) method, total trade is expressed by the following estimation equation:

$$\ln T_{ijt} = \alpha_0 + \alpha_1 DC_{it} + \beta Z_{ijt} + \sum \alpha_2 EXP_i + \sum \alpha_3 IMP_j + \sum \alpha_4 YR_t + \epsilon_{ijt} \quad (4.1)$$

where, T_{ijt} represents real bilateral exports from country i (exporter) to country j (importer) in a given year t. Domestic credit (DC_{it}) for exporter i is used as a proxy for the country's level of financial development and is measured by domestic credit to the private sector as a percentage of GDP, retrieved from the World Development Indicators database of the World Bank. Z_{ijt} is a vector of control variables commonly utilized in gravity trade models that serves as proxies for bilateral trade costs. These proxies include the natural log of distance between countries i and j, GDP per capita of i and j, population of each country in a country-pair and the natural log of the product of the land area of the countries in a country-pair. It also includes bilateral pair dummies such as country pairs using the same currency, having a regional trade agreement, sharing a common language, sharing a common land border or having a colonial relationship. EXP_i & IMP_j are comprehensive sets of time-invariant exporter- and importer-fixed effects that consider any country-specific characteristics. They account for important factors that can influence exports and are likely correlated with DC. YR_t are year-specific fixed effects that consider any time-specific common trends or effects (e.g. business cycles, oil price shocks) and the robust standard errors are clustered by country pairs.

Total exports can mask the heterogeneous impact of FD on trade. To unearth this heterogeneity, we utilize the four-digit Standard International Trade Classification (SITC) Revision 2 product level trade data to construct the extensive and the intensive margins of exports. We analyze whether an increase in financial development leads to countries trading a wider variety of goods i.e. whether financial development gives rise to new trading relationships using the extensive margin; and whether an increase in financial development also leads to a larger volume of existing goods being traded i.e. whether higher financial development increases trade within existing trade relationships using the intensive margin. Total exports T_{ijt} is therefore decomposed into the extensive and intensive margins of exports as follows:

$$\ln T_{ijt} = \ln N_{ijt} + \ln \frac{T_{ijt}}{N_{ijt}} \tag{4.2}$$

where the product-level extensive margin or export diversification is defined as the log of the number of products that a country i exports to j, N, at a given time t; and the product-level intensive margin or trade intensity is defined as the log of the average volume of exports per product from country i to j over time t, calculated by dividing the total volume of exports (T) by the total number of products exported (N).

One important advantage of these dis-aggregated data at the product level is that it can mimic firm level adjustments. When firms produce differentiated products, as Dutt et al. (2013) points out, these firm-level trade margins translate into product-level trade margins. Therefore, the product-level trade margin can be viewed as a proxy for the firm-level trade margin. The methodology we utilize to dis-aggregate total trade flows into the two product level trade margins is commonly known as the count method and have been utilized in various studies (Flam and Nordström, 2006; Bernard et al., 2007; Nitsch and Pisu, 2008; Dutt et al., 2013).

4.3.1 Poisson Specification

Despite being utilized prevalently, the log-linear gravity model of trade is known to provide biased and inconsistent estimates in the presence of heteroscedastic residuals ((Flowerdew and Aitkin, 1982; Santos Silva and Tenreyro, 2006). Santos Silva and Tenreyro (2006) mention that under heteroskedastic errors, the log-linear transformation leads to errors that will generally be correlated with the control variables. This leads to biased estimates of the true elasticities with the OLS specification. They propose the Poisson pseudo-maximum likelihood (PPML) estimation as an alternate and preferred procedure, which, due to its multiplicative form, does not force higher-order moments into the resid-

uals. Therefore, this procedure provides consistency for estimates and also allows for heteroskedasticity in the residuals (Liu, 2009; Santos Silva and Tenreyro, 2006).

The dependent variable, real exports, is now expressed in levels. Under PPML, the augmented model has the following specification:

$$T_{ijt} = exp(\alpha_0 + \alpha_1 DC_{it} + \beta Z_{ijt} + \sum \alpha_2 EXP_i + \sum \alpha_3 IMP_j + \sum \alpha_4 YR_t) + \epsilon_{ijt} \quad (4.3)$$

In addition to the time-invariant exporter and importer fixed effects, we also examine the relationship with PPML regressions and a comprehensive set of country-pair fixed effects. These fixed effects account for any time invariant characteristics common to a country pair. Our results are robust to this specification, but they are omitted for space considerations.[2] Since PPML is a non-linear specification, the decomposition of total exports, T into the extensive and intensive margins of exports has the following specification:

$$T_{ijt} = N_{ijt} * \frac{T_{ijt}}{N_{ijt}} \quad (4.4)$$

4.3.2 Data

We utilize an unbalanced panel for the time period 1962-2015. The common gravity control variables such as distance, common border, language, and colonial ties are collected from the "Center for Prospective Studies and International Information (CEPII)".[3] The disaggregated product level trade data under the SITC-Revision 2 classification at the 4-digit product level is retrieved from Feenstra et al. (2005). The SITC classification comprises of approximately 790 product categories. There exists product level trade data at finer levels of disaggregation (6-digit), however this data set starts from 1995.

4.3.3 Empirical Results

Recent empirical trade literature presents evidence that exemplifies the importance of finance for international trade. While earlier trade models focused on endowment and technology and had presumed the availability of external finance, recent literature focuses more on credit and liquidity constraints for exporting firms and how adequate finance is a comparative advantage for countries. Chor and Manova (2012) describe reasons why external finance is particularly crucial for exporting firms. First, there are trade costs

[2] These results are available from the authors upon request.
[3] Available at http://www.cepii.fr/CEPII/en/welcome.asp.

associated with entering foreign markets including transportation, unavoidable barriers like upfront sunk costs, costs of exploring newer markets, establishing and maintaining new distribution networks, and customizing products to fit foreign preferences and regulations. Second, there are time lags associated with international transactions, on average 30 to 90 days, before payments are processed during which firms may still have to cover business costs. Therefore, having well-developed financial systems becomes crucial for exporting firms. Additionally, the need for external finance differs across sectors - industries with more tangible assets tend to rely more on external finance than those with intangible assets. We explore the impact of financial development on three dependent variables: total trade value, the extensive margin, and the intensive margin. We expect financial development to be positively related to the extensive margin. Since financial constraints restrict exporting firms from entering foreign markets, we can expect the number of exporting firms to increase following advancements in the financial system of the exporting country.

We primarily conduct two sets of analysis to examine the impact of financial development on our trade variables. First, we look at the full sample of countries. For the full sample, we investigate the simple case of the relationship between financial development and our three trade measures, the case of whether the effect of financial development on trade depends on the level of financial development itself, and the case of whether the relationship between financial development and trade measures depend on a country's level of economic development.

Second, we look at product categories. In doing so, does the impact of financial development on trade differ across product categories? While some industries are more reliant on external sources of finance, others are not. Therefore, it is likely that the impact of financial development will differ across different product categories. For example, is the importance of finance the same for labor-intensive and resource-based manufactures as well as for manufactures with high skill and technology intensity? We follow the United Nations Conference on Trade and Development (2002) and categorize total tradable products into 5 categories: primary commodities, labor-intensive and resource-based manufactures, manufactures with low skill and technology intensity, manufactures with medium skill and technology intensity, and manufactures with high skill and technology intensity. It is interesting to find out how FD affects both the extensive and intensive margins of trade, especially for product categories. Some low-tech manufacturing industries like food and clothing want to increase the variety of products that they are exporting abroad, while some high-tech manufacturing industries like machinery and equipment want to increase the volume of existing products. It is interesting to find out how in-

creased availability of external finance affects these exporting goals.

4.3.4 Financial Development and Trade: Full Sample

The results in Table 1 show the effect of financial development on total trade value, the extensive margin, and the intensive margin utilizing the OLS and PPML methods. All regression results include gravity covariates, year fixed effects, and two sets of country fixed effects (exporter and importer). All traditional variables (distance and GDP per capita) have the expected signs in all regressions. For financial development, in the OLS regressions, there are positive effects on total trade, extensive, and intensive margins. However, with the PPML regressions, total trade is no longer statistically significant, and intensive margin changes sign. It is possible that the intensive margin changes signs because of the correlation between GDP per capita and domestic credit. Only for the extensive margin, there is a consistent expected effect for financial development. The coefficients of the natural log of Domestic Credit on the extensive margin for both OLS and PPML methods in Columns (2) and (5) are positive and statistically significant at the 99% level, thus, affirming the idea that increases in financial development increase the variety of goods traded internationally. As per Column (5) of Table 1, a 10% increase in domestic credit increases the extensive margin by 0.57%. The coefficients for total trade value and the intensive margin are inconsistent across estimations and, therefore, cannot confirm the effect of financial development on the two. Following Table 1, the rest of the analyses in this paper have been conducted using PPML estimation, in line with the recent trade literature. All tables are attached at the end of the paper.

The results from Table 1 confirm the positive effect of financial development on the extensive margin of trade. Does the country's level of development matter? The correlation between domestic credit and GDP is 0.45 which provides initial evidence that the level of development matters for the effect of financial development on trade. Poorer countries have lower levels of financial development on average (Table A.3), while richer countries have higher level of financial development (Table A.2). Thus, we could expect poorer countries to experience a stronger impact of increase in financial development on trade. Does diminishing return set in for richer countries? In order to explore the potential diminishing returns, we categorized the full sample of exporting countries into two groups: developed and developing countries. Countries have been classified as developed if they are labeled as high-income by the OECD. The World Integrated Trade Solutions (WITS) Database (2013) provides the list (Table A.4). Developed is a dummy variable that is equal to 1 if the country is a developed country, 0 otherwise. The estimation results in Table 2 show that indeed the level of a country's economic development has an impact on the ef-

fect of finance on trade. The coefficients of Domestic Credit for Total Trade and extensive margin are positive and statistically significant at 0.0963 and 0.259, meaning that higher financial development increases total trade and the extensive margin the more developed the country; and higher financial development decreases the intensive margin the more developed the country. The latter result is consistent with trade literature that stresses on the importance of maintaining existing trading relationships for developing countries (i.e. the importance of intensive margin).The coefficient of the interaction term between a the developed country dummy variable and domestic credit presents the marginal effect of domestic credit on trade according to a country's level of development. This coefficient is negative for both total trade and the extensive margin, which suggests that as a country develops, the effect of domestic credit on trade falls. This means that increases in domestic credit are important in increasing trade for developing countries.

4.3.5 Financial Development and Trade Across Product Categories

In the trade literature, industries producing manufactured goods have been long considered extensive users external finance. In fact Beck (2002) and Beck (2003), two of the earlier empirical papers in the empirical trade literature concerned with the effects of external finance, find strong causal effect of financial development on various manufacturing trade variables. However, this literature has not extended the line of research to investigate these effects on the extensive and intensive margins of trade. We investigate the effect of financial development on these two margins of trade to evaluate whether increase in external finance facilitates trade by increasing the variety of goods being traded (extensive margin) or the volume of goods being traded (intensive margin).

Table 3 presents results for the effect of Domestic Credit on total exports for the five product categories. The coefficient of Domestic Credit for low-tech manufactured goods (Column 2 of Table 3) is positive and statistically significant. The trade literature consistently finds evidence of positive association between financial development and exports of manufactured goods, however, Table 3 demonstrates how a majority of that positive association comes from the low-tech manufacturing goods like food, beverages, textiles, and clothing, instead of medium-tech manufactured goods like plastic, iron, and steel, and high-tech manufactured goods like computers and pharmaceuticals. The coefficient of Domestic Credit for medium-tech manufactured goods is negative and statistically significant, meaning that an increase in financial development decreases total exports of this product category.

Table 4 presents results for the effect of Domestic Credit on the extensive margin for the five product categories. Our results in Table 1 demonstrated that there is a significant

effect of financial development on the extensive margin of trade. That is, an increase in financial development increases the variety of goods being traded internationally. A glance at Table 4 tells us that an increase in Domestic Credit increases the extensive margin across all products, being positive and statistically significant at the 99% level of significance, meaning that financial development increases the variety of goods traded internationally across these five product categories. The magnitude seems to be only slightly higher for high-technology-intensive manufactured goods and labor intensive goods.

Table 5 presents results for the effect of Domestic Credit on the intensive margin for the five product categories. The coefficient estimates of Domestic Credit for low-tech and high-tech manufactured goods are positive and statistically significant at the 95% and 99% levels respectively. This means that an increase in financial development increases the volume of goods traded internationally for these two product categories. The coefficients of Domestic Credit for medium-tech manufactured goods and non-fuel primary commodities are negative and statistically significant, meaning that increases in financial development decreases the volume of goods being traded for these two product categories.

4.4 Conclusion

This paper use disaggregated product level bilateral trade data to estimate the impact of overall financial development on total trade, the extensive and the intensive margins of trade. The analysis is conducted for a full sample of products and five different product categories of primary commodities, labor-intensive and resource-based manufactures, manufactures with low skill and technology intensity, manufactures with medium skill and technology intensity, and manufactures with high skill and technology intensity as per the United Nations Conference on Trade and Development (2002). Additionally, this paper also studies if there is a heterogeneous effect of financial development on trade at different levels of financial development and economic development.

The estimation results show that increase in financial development increases the extensive margin, i.e. the total number of products being traded. Therefore, increase in financial development leads to new trading relationships. Financial development also increases the extensive margin for all product categories, however, this is not true for total trade and the intensive margin. Evidence suggests that financial development increases total trade only for low-tech manufactured goods, while it increases the intensive margin for low-tech and high-tech manufactured goods only. This means that increases in financial development increases trade or export volume within existing trading relationships for low-tech and high-tech manufactured industries. This has important implications for

export-based policy making, especially in developing countries that aim to increase exports to increase long-term economic growth. Evidence on the heterogeneous impact of financial development suggests that countries which higher financial development are associated with higher total trade and more variety of products traded and that the effect of financial development on trade is higher for developing countries.

4.5 Tables

See next couple of pages.

Table 4.1: Financial Development and Trade Margins

	OLS			PPML		
	Total Trade	Extensive Margin	Intensive Margin	Total Trade	Extensive Margin	Intensive Margin
Dependent Variable$_{ijt}$	(1)	(2)	(3)	(4)	(5)	(6)
Log(Domestic Credit)$_{it}$	0.215***	0.168***	0.047***	-0.046	0.057***	-0.362***
	(0.015)	(0.007)	(0.012)	(0.032)	(0.006)	(0.050)
Log distance	-1.397***	-0.809***	-0.588***	-0.680***	-0.505***	-0.106**
	(0.018)	(0.011)	(0.012)	(0.032)	(0.014)	(0.045)
Log RGDP per capita (exp.)	0.872***	0.298***	0.574***	0.778***	0.208***	0.948***
	(0.021)	(0.011)	(0.017)	(0.042)	(0.009)	(0.064)
Log RGDP per capita (imp.)	0.688***	0.323***	0.366***	0.688***	0.190***	0.184
	(0.019)	(0.011)	(0.015)	(0.044)	(0.010)	(0.117)
Adjusted R^2	0.701	0.762	0.522	0.860	0.719	0.279
Number of observations	573,650	573,650	573,650	573,650	573,650	573,650

Notes: Dependent variables are in logs under the OLS specification (columns 1-3) and are in levels under the PPML specification (columns 4-6). All estimates are obtained with year, exporter and importer fixed effects. Additional gravity control variables are included but not reported in the table. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.10. The R^2 value for the PPML estimation is a pseudo-R^2, hence not directly comparable to the R^2 produced by OLS estimation.

Table 4.2: Impact of FD on Export Margins & Country's Level of Development

	Total Trade	Extensive Margin	Intensive Margin
Dependent Variable$_{ijt}$	(1)	(2)	(3)
Log(Domestic Credit)$_{it}$	0.0963**	0.259***	-0.392***
	(0.042)	(0.010)	(0.054)
Developed	2.468***	3.917***	-2.203***
	(0.529)	(0.200)	(0.600)
Developed$*$DC	-0.255***	-0.389***	0.371***
	(0.050)	(0.013)	(0.080)
Log Distance	-0.672***	-0.507***	-0.106**
	(0.033)	(0.014)	(0.044)
Log real GDP per capita (exporter)	0.725***	0.088***	0.887***
	(0.043)	(0.010)	(0.058)
Log real GDP per capita (importer)	0.622***	0.162***	0.133
	(0.044)	(0.010)	(0.116)
Adjusted R^2	0.857	0.713	0.278
Number of Observations	573650	573650	573650

Notes: All of the dependent variables are in levels under the PPML specification. All estimates are obtained with year, exporter and importer fixed effects. Additional gravity control variables are included but not reported in the table. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.10. The R^2 value for the PPML estimation is a pseudo-R^2, hence not directly comparable to the R^2 produced by OLS estimation.

Table 4.3: FD & Total Exports across Product Categories

	Labor Intensive Goods	Low-tech -intensive Manufacture goods	Medium-tech -intensive Manufacture goods	High-tech -intensive Manufacture goods	Non-fuel Primary Commodities
Log(Domestic Credit)$_{it}$	0.011 (0.051)	0.077* (0.046)	-0.109*** (0.037)	0.0923 (0.071)	0.0283 (0.035)
Log Distance	-0.836*** (0.047)	-0.933*** (0.033)	-0.744*** (0.047)	-0.677*** (0.038)	-0.853*** (0.034)
Log real GDP per capita (exporter)	0.570*** (0.103)	0.735*** (0.056)	0.972*** (0.064)	0.905*** (0.049)	0.362*** (0.047)
Log real GDP per capita (importer)	0.663*** (0.072)	0.552*** (0.050)	0.813*** (0.055)	0.757*** (0.086)	0.730*** (0.063)
Adjusted R^2	0.775	0.822	0.891	0.816	0.805
Number of Observations	573,650	573,650	573,650	573,650	573,650

Notes: Dependent variables are in levels under the PPML specification. All estimates are obtained with year, exporter and importer fixed effects. Additional gravity control variables are included but not reported in the table. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.10. The R^2 value for the PPML estimation is a pseudo-R^2, hence not directly comparable to the R^2 produced by OLS estimation.

Table 4.4: FD & Extensive Margin across Product Categories

	Labor Intensive Goods	Low-tech -intensive Manufacture goods	Medium-tech -intensive Manufacture goods	High-tech -intensive Manufacture goods	Non-fuel Primary Commodities
Log(Domestic Credit)$_{it}$	0.066***	0.048***	0.0429***	0.066***	0.052***
	(0.007)	(0.008)	(0.006)	(0.007)	(0.007)
Log Distance	-0.500***	-0.548***	-0.458***	-0.481***	-0.611***
	(0.014)	(0.015)	(0.014)	(0.015)	(0.015)
Log real GDP per capita (exporter)	0.116***	0.204***	0.261***	0.243***	0.174***
	(0.010)	(0.011)	(0.010)	(0.010)	(0.011)
Log real GDP per capita (importer)	0.250***	0.178***	0.178***	0.167***	0.185***
	(0.011)	(0.012)	(0.009)	(0.010)	(0.012)
Adjusted R^2	0.687	0.674	0.716	0.716	0.676
Number of Observations	573,650	573,650	573,650	573,650	573,650

Notes: Dependent variables are in levels under the PPML specification. All estimates are obtained with year, exporter and importer fixed effects. Additional gravity control variables are included but not reported in the table. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.10. The R^2 value for the PPML estimation is a pseudo-R^2, hence not directly comparable to the R^2 produced by OLS estimation.

Table 4.5: FD & Intensive Margin across Product Categories

	Labor Intensive Goods	Low-tech -intensive Manufacture goods	Medium-tech -intensive Manufacture goods	High-tech -intensive Manufacture goods	Non-fuel Primary Commodities
Log(Domestic Credit)$_{it}$	0.001	0.087**	-0.158***	0.153***	-0.053**
	(0.073)	(0.039)	(0.050)	(0.054)	(0.025)
Log Distance	-0.527***	-0.543***	-0.664***	-0.499***	-0.283***
	(0.038)	(0.034)	(0.037)	(0.032)	(0.026)
Log real GDP per capita (exporter)	0.495***	0.608***	0.947***	0.889***	0.252***
	(0.086)	(0.055)	(0.061)	(0.046)	(0.031)
Log real GDP per capita (importer)	0.451***	0.368***	0.715***	0.550***	0.355***
	(0.060)	(0.058)	(0.058)	(0.076)	(0.042)
Adjusted R^2	0.408	0.598	0.85	0.728	0.357
Number of Observations	417,488	329,875	389,362	406,380	469,468

Notes: Dependent variables are in levels under the PPML specification. All estimates are obtained with year, exporter and importer fixed effects. Additional gravity control variables are included but not reported in the table. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.10. The R^2 value for the PPML estimation is a pseudo-R^2, hence not directly comparable to the R^2 produced by OLS estimation.

Appendices

Appendix A: Chapter 1

Data Appendix

Data Descriptions

$EIA_{i,j}$ is a multichotomous index (0-6) retrieved from the NSF-Kellogg Institute Data Base on Economic Integration Agreements, where 0 denotes no existing Economic Integration Agreement, 1 denotes a One-Way Preferential Trade Agreement, 2 denotes a Two-Way Preferential Trade Agreement, 3 denotes a Free Trade Agreement, 4 denotes a Customs Union, 5 denotes a Common Market, and 6 denotes an Economic Union.

List of Countries

Table A1: List of Poor Countries

Bangladesh	Ghana	Kenya	Pakistan	Sri Lanka
Brazil	India	Malaysia	Paraguay	Thailand
Bulgaria	Indonesia	Mexico	Peru	Tunisia
China	Jamaica	Morocco	Philippines	Turkey
Colombia	Jordan	Namibia	Romania	Ukraine
Ecuador	Kazakhstan	Nigeria	South Africa	Zambia
				Zimbabwe

Table A2: List of Non-Poor Countries

Argentina	Czech Republic	Malta	Singapore
Australia	Denmark	Mauritius	Slovenia
Austria	Finland	Mexico	South Africa
Barbados	France	Namibia	Spain
Belgium	Germany	Netherlands	Sweden
Botswana	Greece	New Zealand	Switzerland
Brazil	Hungary	Norway	Thailand
Bulgaria	Ireland	Oman	Trinidad and Tobago
Canada	Israel	Panama	Tunisia
Chile	Italy	Peru	Turkey
China	Jamaica	Poland	United Arab Emirates
Colombia	Japan	Portugal	United Kingdom
Costa Rica	Kazakhstan	Qatar	United States
Croatia	Luxembourg	Romania	Uruguay
Cyprus	Malaysia	Russian Federation	

Additional Tables

Table A.1: Summary Statistics: Poor vs Non-Poor Exporters

Variable	Poor	Non-Poor
Log of Banking Credit_EXP	3.388	4.221
Log of Banking Credit_IMP	3.976	4.001
Log of Capitalization_EXP	2.922	3.856
Log of Capitalization_IMP	3.605	3.600
N	11,812	36,517

Table A.2: Summary Statistics: Poor Exporters and Poor Importers

Variable	Obs	Mean	Std. Dev.	Min	Max
Log of Banking Credit_EXP	3,077	3.35829	0.760976	1.624044	5.11502
Log of Banking Credit_IMP	3,077	3.309689	0.773014	1.576538	5.11502
Log of Capitalization_EXP	3,077	2.824796	1.178511	-3.08002	5.461172
Log of Capitalization_IMP	3,077	2.791391	1.176852	-3.08002	5.461172

Table A.3: Summary Statistics: Poor Exporters and Non-Poor Importers

Variable	Obs	Mean	Std. Dev.	Min	Max
Log of Banking Credit_EXP	8,686	3.397132	0.724287	1.624044	5.11502
Log of Banking Credit_IMP	8,686	4.214214	0.730474	-1.6811	5.493947
Log of Capitalization_EXP	8,686	2.956407	1.120714	-3.08002	5.461172
Log of Capitalization_IMP	8,686	3.897588	0.887676	0.244023	5.787998

Table A.4: Summary Statistics: Non-Poor Exporters and Poor Importers

Variable	Obs	Mean	Std. Dev.	Min	Max
Log of Banking Credit_EXP	9,057	4.22036	0.72943	-1.6811	5.493947
Log of Banking Credit_IMP	9,057	3.357509	0.74316	1.576538	5.11502
Log of Capitalization_EXP	9,057	3.909854	0.891185	0.244023	5.787998
Log of Capitalization_IMP	9,057	2.919193	1.140008	-3.08002	5.461172

Table A.5: Summary Statistics: Non-Poor Exporters and Non-Poor Importers

Variable	Obs	Mean	Std. Dev.	Min	Max
Log of Banking Credit_EXP	27,326	4.220159	0.711389	-1.6811	5.493947
Log of Banking Credit_IMP	27,326	4.215817	0.713175	-1.6811	5.493947
Log of Capitalization_EXP	27,326	3.837152	0.916536	0.143226	5.787998
Log of Capitalization_IMP	27,326	3.829432	0.933805	-0.96067	5.787998

Table A.6: Correlations between Financial Variables and GDP

	$BankCred_i$	$BankCred_j$	$MarketCap_i$	$MarketCap_j$	$LnGDP_i$	$LnGDP_j$
$BankCred_i$	1					
$BankCred_j$	0.0115	1				
$MarketCap_i$	0.6217	0.0046	1			
$MarketCap_j$	0.0054	0.6105	0.0269	1		
$LnGDP_i$	0.4315	0.0154	0.4028	0.0077	1	
$LnGDP_j$	0.0229	0.4521	0.0087	0.3913	0.0139	1

Table A.9: Panel Gravity Regression of Finance and Trade: 3-, 4-, 5-year Intervals

Variable	(1)	(2)	(3)	(4)
	Main	3-Year	4-Year	5-Year
BankCred_i	0.381***	0.422***	0.514***	0.690***
	(0.059)	(0.091)	(0.119)	(0.137)
BankCred_j	0.031	0.147	0.163	0.083
	(0.049)	(0.084)	(0.110)	(0.131)
MCap_i	0.444***	0.524***	0.582***	0.672***
	(0.062)	(0.096)	(0.113)	(0.125)
MCap_j	0.0878	-0.129	0.126	0.0459
	(0.055)	(0.083)	(0.105)	(0.120)
BankCred_i*MCap_i	-0.112***	-0.139***	-0.152***	-0.195***
	(0.016)	(0.024)	(0.030)	(0.034)
BankCred_j*MCap_j	0.00232	-0.00455	-0.0154	0.00748
	(0.014)	(0.021)	(0.028)	(0.032)
N	59,834	21,922	16,988	12,842
R-sq	0.937	0.940	0.946	0.952

Appendix B: Chapter 2

Regression Tables

Table A10: Impact of "Accounts" on Poverty: All Countries

Dependent Variable	POVPOP	POVHEAD550	POVGAP550
lnitial GDP Per Capita	-4.498**	-11.109***	-6.027***
	(1.983)	(2.018)	(1.260)
Financial Development	-0.573	-12.304***	-7.970**
	(3.712)	(4.302)	(3.365)
Accounts	0.313	-1.007***	-0.513***
	(0.340)	(0.255)	(0.182)
Interaction - Accounts	-0.067	0.226***	0.138***
	(0.080)	(0.055)	(0.042)
Human Capital	-6.569**	-7.942***	-7.283***
	(2.538)	(3.031)	(1.678)
Population Growth	247.602	315.614**	249.203***
	(159.130)	(129.737)	(83.849)
Gross Capital Formation	-0.495***	0.106	-0.096
	(0.163)	(0.183)	(0.121)
Implied Marginal Effect:			
At Q25	-2.142	-4.015	-2.918
	(2.443)	(2.739)	(2.043)
At Median	-3.637	1.429	0.401
	(2.255)	(2.180)	(1.438)
At Q75	-5.092	8.000***	4.407***
	(3.222)	(2.481)	(1.503)
Observations	106	147	147
R-squared	0.489	0.820	0.780

Note: Standard errors in parentheses are adjusted for heteroscedasticity.
All regressions include time fixed effects.
* p¡0.1 ** p¡0.05 *** p¡0.01

Table A11: Impact of ”Saved at a Financial Institution” on Poverty: All Countries

Dependent Variable	POVPOP	POVHEAD550	POVGAP550
lnitial GDP Per Capita	-5.220***	-14.292***	-6.913***
	(1.684)	(1.881)	(1.164)
Financial Development	4.156	-7.607**	-3.649*
	(3.804)	(3.018)	(2.008)
Savedfin	2.286***	-0.656	-0.125
	(0.775)	(0.505)	(0.293)
Interaction - Savedfin	-0.529***	0.213**	0.08
	(0.185)	(0.105)	(0.061)
Human Capital	-6.015**	-11.029***	-9.064***
	(2.437)	(3.151)	(1.654)
Population Growth	249.114*	293.122**	203.143**
	(143.972)	(119.923)	(78.090)
Gross Capital Formation	-0.460***	-0.061	-0.167
	(0.150)	(0.160)	(0.111)
Implied Marginal Effect:			
At Q25	0.006	-5.533**	-2.871*
	(2.676)	(2.340)	(1.618)
At Median	-2.558	-4.306**	-2.410*
	(2.181)	(2.074)	(1.454)
At Q75	-6.617***	-0.053	-0.815
	(2.063)	(2.416)	(1.512)
Observations	106	147	147
R-squared	0.529	0.815	0.778

Note: Standard errors in parentheses are adjusted for heteroscedasticity.
All regressions include time fixed effects.
* p¡0.1 ** p¡0.05 *** p¡0.01

Table A12: Impact of "Borrow" on Poverty: All Countries

Dependent Variable	POVPOP	POVHEAD550	POVGAP550
lnitial GDP Per Capita	-2.079	-10.610***	-4.524***
	(1.898)	(2.372)	(1.036)
Financial Development	0.254	6.267**	4.972***
	(5.334)	(2.765)	(1.568)
Borrow	1.318	6.322***	3.548***
	(2.394)	(1.944)	(1.115)
Interaction - Borrow	-0.189	-1.322***	-0.837***
	(0.658)	(0.476)	(0.264)
Human Capital	-3.022	-1.969	-3.965
	(2.972)	(4.788)	(2.437)
Population Growth	580.771**	408.276**	267.536**
	(233.822)	(202.953)	(114.373)
Gross Capital Formation	-0.807***	-0.027	-0.097
	(0.153)	(0.197)	(0.107)
Implied Marginal Effect:			
At Q25	-0.324	3.517*	3.229**
	(3.671)	(2.088)	(1.268)
At Median	-0.955	0.088	1.057
	(2.529)	(1.736)	(1.177)
At Q75	-1.391	-4.609*	-1.918
	(2.676)	(2.472)	(1.613)
Observations	61	83	83
R-squared	0.547	0.788	0.747

Note: Standard errors in parentheses are adjusted for heteroscedasticity.
All regressions include time fixed effects.
* p¡0.1 ** p¡0.05 *** p¡0.01

Table A13: Impact of "Accounts" on Poverty: Developing Countries

Dependent Variable	POVPOP	POVHEAD550	POVGAP550
lnitial GDP Per Capita	-3.940**	-13.272***	-6.584***
	(1.904)	(2.481)	(1.299)
Financial Development	2.914	-3.953	-2.439
	(4.328)	(5.087)	(3.540)
Accounts	0.356	-0.685	-0.449*
	(0.376)	(0.436)	(0.256)
Interaction - Accounts	-0.098	0.114	0.093
	(0.092)	(0.107)	(0.064)
Human Capital	-4.376	-9.422**	-8.618***
	(3.066)	(3.763)	(1.931)
Population Growth	602.463***	602.416**	557.087***
	(228.128)	(270.374)	(144.040)
Gross Capital Formation	-0.480***	0.083	-0.124
	(0.175)	(0.206)	(0.119)
Implied Marginal Effect:			
At Q25	0.954	-1.476	-0.427
	(3.033)	(3.275)	(2.404)
At Median	-1.208	0.813	1.434
	(2.533)	(2.505)	(1.736)
At Q75	-2.717	2.416	2.737
	(3.046)	(2.938)	(1.751)
Observations	88	89	89
R-squared	0.502	0.782	0.818

Note: Standard errors in parentheses are adjusted for heteroscedasticity.
All regressions include time fixed effects.
* p¡0.1 ** p¡0.05 *** p¡0.01

Table A14: Impact of "Saved at a Financial Institution" on Poverty: Developing Countries

Dependent Variable	POVPOP	POVHEAD550	POVGAP550
lnitial GDP Per Capita	-5.426***	-17.068***	-8.384***
	(1.591)	(2.079)	(1.111)
Financial Development	5.185	-1.533	0.711
	(3.800)	(3.936)	(2.469)
Savedfin	2.413***	0.417	0.342
	(0.808)	(1.059)	(0.566)
Interaction - Savedfin	-0.545***	-0.09	-0.072
	(0.193)	(0.241)	(0.128)
Human Capital	-3.287	-10.452***	-9.156***
	(2.832)	(3.930)	(1.946)
Population Growth	600.298***	554.336**	541.436***
	(215.917)	(267.750)	(141.534)
Gross Capital Formation	-0.523***	-0.032	-0.159
	(0.158)	(0.195)	(0.122)
Implied Marginal Effect:			
At Q25	1.409	-2.184	0.190
	(2.835)	(2.938)	(2.012)
At Median	-1.397	-2.642	-0.176
	(2.364)	(2.723)	(1.905)
At Q75	-3.386	-2.978	-0.445
	(2.246)	(2.902)	(1.965)
Observations	88	89	89
R-squared	0.543	0.769	0.811

Note: Standard errors in parentheses are adjusted for heteroscedasticity.
All regressions include time fixed effects.
* p¡0.1 ** p¡0.05 *** p¡0.01

Table A15: Impact of ”Borrow” on Poverty: Developing Countries

Dependent Variable	POVPOP	POVHEAD550	POVGAP550
lnitial GDP Per Capita	-2.124	-13.144***	-5.723***
	(1.841)	(2.820)	(1.209)
Financial Development	-0.422	0.998	4.470*
	(5.630)	(5.559)	(2.284)
Borrow	0.379	3.122	2.314*
	(2.633)	(3.084)	(1.358)
Interaction - Borrow	0.113	-0.456	-0.52
	(0.725)	(0.835)	(0.342)
Human Capital	-1.832	-2.935	-5.520**
	(2.941)	(5.348)	(2.649)
Population Growth	906.758***	699.340*	558.008***
	(244.101)	(359.243)	(177.010)
Gross Capital Formation	-0.846***	-0.12	-0.209*
	(0.161)	(0.236)	(0.122)
Implied Marginal Effect:			
At Q25	0.013	-1.204	1.960
	(3.432)	(2.617)	(1.404)
At Median	0.359	-2.391	0.607
	(2.669)	(2.714)	(1.576)
At Q75	0.579	-3.334	-0.467
	(3.055)	(3.810)	(2.006)
Observations	53	53	53
R-squared	0.599	0.730	0.766

Note: Standard errors in parentheses are adjusted for heteroscedasticity.
All regressions include time fixed effects.
* p¡0.1 ** p¡0.05 *** p¡0.01

List of Countries

Table A16: List of All Countries

Albania	Benin	Chile	Denmark
Algeria	Bolivia	China	Dominican Rep.
Angola	Botswana	Colombia	Ecuador
Argentina	Brazil	Congo, Dem. Rep.	Egypt, Arab Rep.
Armenia	Bulgaria	Congo, Rep.	El Salvador
Australia	Burkina Faso	Costa Rica	Estonia
Austria	Burundi	Cote d'Ivoire	Finland
Bahrain	Cambodia	Croatia	France
Bangladesh	Cameroon	Cyprus	Gabon
Belgium	Central Afr. Rep.	Czech Rep.	Germany
Ghana	Iraq	Kuwait	Mauritania
Greece	Ireland	Kyrgyz Rep.	Mauritius
Guatemala	Israel	Latvia	Mexico
Haiti	Italy	Lithuania	Moldova
Honduras	Jamaica	Luxembourg	Mongolia
Hong Kong, China	Japan	Madagascar	Namibia
Hungary	Jordan	Malawi	Nepal
India	Kazakhstan	Malaysia	Netherlands
Indonesia	Kenya	Mali	Nicaragua
Iran, Islamic Rep.	Korea, Rep.	Malta	Niger
Nigeria	Russian Fed.	Spain	Uganda
Norway	Rwanda	Sri Lanka	Ukraine
Pakistan	Saudi Arabia	Sudan	UAE
Panama	Senegal	Sweden	United Kingdom
Paraguay	Serbia	Tajikistan	United States
Peru	Sierra Leone	Tanzania	Uruguay
Philippines	Singapore	Thailand	Venezuela, RB
Poland	Slovak Republic	Togo	Vietnam
Portugal	Slovenia	Tunisia	Zambia
Romania	South Africa	Turkey	

Table A17: List of Developing Countries - Accounts and Savings

Albania	Benin	Central African Rep.	Dominican Rep.
Algeria	Bolivia	Chile	Ecuador
Angola	Botswana	China	Egypt, Arab Rep.
Argentina	Brazil	Colombia	El Salvador
Armenia	Burkina Faso	Congo, Dem. Rep.	Gabon
Bahrain	Burundi	Congo, Rep.	Ghana
Bangladesh	Cambodia	Costa Rica	Guatemala
	Cameroon	Cote d'Ivoire	Zambia
Haiti	Jamaica	Malawi	Namibia
Honduras	Jordan	Malaysia	Nepal
Hong Kong, China	Kazakhstan	Mali	Nicaragua
India	Kenya	Mauritania	Niger
Indonesia	Korea, Rep.	Mauritius	Nigeria
Iran, Islamic Rep.	Kuwait	Mexico	Pakistan
Iraq	Kyrgyz Republic	Moldova	Panama
Israel	Madagascar	Mongolia	Paraguay
Peru	Singapore	Tunisia	
Philippines	South Africa	Turkey	
Russian Fed.	Sri Lanka	Uganda	
Rwanda	Sudan	Ukraine	
Saudi Arabia	Tajikistan	United Arab Emirates	
Senegal	Tanzania	Uruguay	
Serbia	Thailand	Venezuela, RB	
Sierra Leone	Togo	Vietnam	

Table A18: List of Developing Countries - Borrow

Albania	Botswana	Colombia	Egypt, Arab Rep.
Algeria	Brazil	Congo, Dem. Rep.	El Salvador
Argentina	Burkina Faso	Congo, Rep.	Gabon
Armenia	Cambodia	Costa Rica	Ghana
Bangladesh	Cameroon	Cote d'Ivoire	Guatemala
Benin	Chile	Dominican Rep.	Haiti
Bolivia	China	Ecuador	Honduras
India	Kyrgyz Rep.	Mongolia	Panama
Indonesia	Madagascar	Namibia	Peru
Iraq	Malaysia	Nepal	Philippines
Kazakhstan	Mali	Nicaragua	Russian Fed.
Kenya	Mauritania	Niger	Rwanda
Korea, Rep.	Mauritius	Nigeria	Saudi Arabia
Kuwait	Mexico	Pakistan	Senegal
Serbia	Togo	Vietnam	
Sierra Leone	Tunisia		
Singapore	Turkey		
South Africa	Uganda		
Sri Lanka	Ukraine		
Tanzania	United Arab Emirates		
Thailand	Uruguay		

Data Sources

Table A19: List of Variables and Sources

Indicator Name	Source
Account (% age 15+)	Global Findex database
Saved at a financial institution (% age 15+)	Global Findex database
Borrowed to start, operate, or expand a farm or business (% age 15+)	Global Findex database
Debit card ownership (% age 15+)	Global Findex database
Credit card ownership (% age 15+)	Global Findex database
Domestic credit to private sector by banks (% of GDP)	International Monetary Fund, International Financial Statistics and data files, and World Bank and OECD GDP estimates.
GDP per capita (constant 2010 US$)	World Bank national accounts data, and OECD National Accounts data files.
Poverty headcount ratio at national poverty lines (% of population)	World Bank, Global Poverty Working Group. Data are compiled from official government sources or are computed by World Bank staff using national (i.e. country–specific) poverty lines.

Indicator Name	Source
Poverty headcount ratio at $5.50 a day (2011 PPP) (% of population)	World Bank, Development Research Group. Data are based on primary household survey data obtained from government statistical agencies and World Bank country departments. Data for high-income economies are from the Luxembourg Income Study database. For more information and methodology, please see PovcalNet (http://iresearch.worldbank.org/PovcalNet/index.htm).
Poverty headcount ratio at $3.20 a day (2011 PPP) (% of population)	World Bank, Development Research Group. Data are based on primary household survey data obtained from government statistical agencies and World Bank country departments. Data for high-income economies are from the Luxembourg Income Study database. For more information and methodology, please see PovcalNet (http://iresearch.worldbank.org/PovcalNet/index.htm).
Poverty headcount ratio at $1.90 a day (2011 PPP) (% of population)	World Bank, Development Research Group. Data are based on primary household survey data obtained from government statistical agencies and World Bank country departments. Data for high-income economies are from the Luxembourg Income Study database. For more information and methodology, please see PovcalNet (http://iresearch.worldbank.org/PovcalNet/index.htm).
Poverty gap at $1.90 a day (2011 PPP) (%)	World Bank, Development Research Group. Data are based on primary household survey data obtained from government statistical agencies and World Bank country departments. Data for high-income economies are from the Luxembourg Income Study database. For more information and methodology, please see PovcalNet (http://iresearch.worldbank.org/PovcalNet/index.htm).

Indicator Name	Source
Poverty gap at $3.20 a day (2011 PPP) (%)	World Bank, Development Research Group. Data are based on primary household survey data obtained from government statistical agencies and World Bank country departments. Data for high-income economies are from the Luxembourg Income Study database. For more information and methodology, please see PovcalNet (http://iresearch.worldbank.org/PovcalNet/index.htm).
Poverty gap at $5.50 a day (2011 PPP) (%)	World Bank, Development Research Group. Data are based on primary household survey data obtained from government statistical agencies and World Bank country departments. Data for high-income economies are from the Luxembourg Income Study database. For more information and methodology, please see PovcalNet (http://iresearch.worldbank.org/PovcalNet/index.htm).
Population, total	(1) United Nations Population Division. World Population Prospects: 2017 Revision. (2) Census reports and other statistical publications from national statistical offices, (3) Eurostat: Demographic Statistics, (4) United Nations Statistical Division. Population and Vital Statistics Reprot (various years), (5) U.S. Census Bureau: International Database, and (6) Secretariat of the Pacific Community: Statistics and Demography Programme.
Gross capital formation (% of GDP)	World Bank national accounts data, and OECD National Accounts data files.
Human capital index	Penn World Tables 9.1

Appendix C: Chapter 3

Additional Tables

Appendix Table A.1 : Summary Statistics, Full sample

Variable	Obs	Mean	Std. Dev.	Min	Max
lnDomesticredit	610,238	3.514	0.964	-1.681	5.733
lnBankDomesticCredit	610,782	3.448	0.953	-1.681	5.733
lnMarketCapitalization	298,415	3.563	1.233	-3.080	7.134
lnStocksturnoverratio	286,951	3.267	1.396	-4.181	7.451

Appendix Table A.2 : Summary Statistics, Developed Countries

Variable	Obs	Mean	Std. Dev.	Min	Max
lnDomesticredit	183,242	4.192	0.732	-1.681	5.733
lnBankDomesticCredit	183,242	4.102	0.714	-1.681	5.733
lnMarketCapitalization	173,961	3.630	1.051	-1.348	5.788
lnStocksturnoverratio	170,109	3.632	1.253	-3.006	6.543

Appendix Table A.3 : Summary Statistics, Developing Countries

Variable	Obs	Mean	Std. Dev.	Min	Max
lnDomesticredit	426,996	3.223	0.903	-0.910	5.542
lnBankDomesticCredit	427,540	3.168	0.904	-1.093	5.542
lnMarketCapitalization	124,454	3.470	1.445	-3.080	7.134
lnStocksturnoverratio	116,842	2.735	1.422	-4.181	7.451

Appendix Table A.4 : List of Developed Countries

Australia	France	Korea, Rep.	Slovak Republic
Austria	Germany	Luxembourg	Slovenia
Belgium	Greece	Mexico	Spain
Canada	Hungary	Netherlands	Sweden
Chile	Iceland	New Zealand	Switzerland
Czech Republic	Ireland	Norway	Turkey
Denmark	Israel	Poland	United Kingdom
Estonia	Italy	Portugal	United States
Finland	Japan		

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